

*Final*

# **Environmental Assessment**



## **Implementation of the Natural Resources Management Program**

**Clear Air Force Station, Alaska**

*June 2003*

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**Title:** Environmental Assessment (EA) for Implementing the Integrated Natural Resource Management Plan at Clear Air Force Station, Alaska.

**Date:** June 2003

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**Abstract:** This Final EA has been prepared in accordance with the *National Environmental Policy Act* of 1969, as amended, and assesses impacts from implementing the Integrated Natural Resources Management Plan (INRMP) at Clear Air Force Station. This EA serves as the vehicle to integrate all natural resource management elements and provide good stewardship of all natural resource assets found on Clear AFS. The EA analyzes the Proposed Action, Current Situation, and No Action Alternatives. The No Action Alternative would fulfill the minimum mission requirements that adhere to regulatory and environmental laws, orders, statutes, and Air Force directives. The Current Situation Alternative would continue the direction provided by the present management activities and allow for some improvements depending on availability of personnel and funding. The Proposed Action would implement a combination of medium and high intensity management levels for the INRMP. No significant impacts were identified in the EA.

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***FINDING OF NO SIGNIFICANT IMPACT***  
***Implementation of the Natural Resources Management Program***  
***Clear Air Force Station, Alaska***

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Pursuant to Section 102(2)© of the *National Environmental Policy Act* (NEPA) of 1969 and the Council on Environmental Quality regulations (40 CFR Sec. 1500-1508) implementing the procedural provisions of NEPA, the Department of Defense gives notice that an Environmental Assessment (EA) has been prepared for Implementation of the Natural Resources Management Plan at Clear Air Force Station (AFS), Alaska, attached and incorporated by reference. Based on the EA it has been determined that an Environmental Impact Statement (EIS) is not required for the Proposed Actions.

**PROPOSED ACTION AND ALTERNATIVES**

The action is to evaluate the potential environmental consequences for implementation of the Integrated Natural Resources Management Plan (INRMP) for Clear Air Force Station (AFS), Alaska. The EA facilitates environmental overview of integrated natural resource management elements and assists the installation in providing good stewardship of all natural and cultural resource assets found on Clear AFS. The objectives of the proposed implementation and integration of the natural resource management plan at Clear AFS are to: (1) provide the tools and the management intensity level that would allow for the effective ecosystem management of Clear AFS lands, (2) continue with mission support for the installation while implementing the INRMP, and (3) comply with federal regulations and satisfy the requirements of environmental laws and procedures.

Three Alternatives were analyzed in the environmental assessment. They include: Alternative A (No Action Alternative), Alternative B (Current Situation), and Alternative C (Proposed Action). Alternative C proposes a combination of high and medium intensity management levels for Clear's natural resources.

**FINDINGS**

The following paragraphs summarize impacts that would likely occur from implementing any of the alternatives.

**Physical Resources.** Alternative A would not result in short-term impacts to air quality, geological resources, soil, or water resources, but could result in significant long-term impacts to these resources due to a continued high risk of wildfires. Depending on the intensity of a wildfire, significant amounts of pollutants could be generated, as well as substantially increased soil erosion and sedimentation of surface water and wetlands. Short-term impacts to air quality or geological, soil, and water resources would not be significant from Alternative B. The long-term risk of wildfire would be slightly reduced through the maintenance of firebreaks. Proposed activities under Alternative C would generate increased criteria air pollutants, increase soil erosion and sedimentation, and result in minor changes to groundwater. The impacts would not be significant. As forest management activities progress, the risk of wildfire would be diminished. Other smaller projects would have minimal impacts on physical factors.



**Biological Resources.** Alternative A would result in minimal disturbance to vegetation as the minimum military mission requirements are implemented. Alternative B would maintain the current, low-intensity management practices applied by Clear AFS and impacts would not be significant. Implementation of Alternative C would be beneficial to all biological resources on Clear AFS. Native vegetation would benefit from a fire management plan, and the corresponding prescribed burning, as well as an invasive species control plan. Fisheries on Clear AFS would benefit from the proposed non-application of pesticides near lakes, fish stocking, and removal of pest fish species. An increase in native habitat, due to forest management practices, would benefit wildlife on the installation, while threatened and endangered species would be inventoried and continue to be monitored under appropriate Federal and state regulations. Wetlands would benefit from an increased effort to preserve intact and undisturbed areas.

**Pest Management.** Alternatives A and B would not impact pest management or the physical and biological environment. Alternative C would result in long-term changes in pest management with minor impacts to the physical and biological environment. These impacts would not be significant.

**Outdoor Recreation.** Implementation of Alternative A would not effect outdoor recreation at Clear AFS. Minimal changes to outdoor recreation would occur under Alternative B, impacts would not be significant. Alternative C would beneficially expand outdoor recreation opportunities at Clear AFS. Forest management activities under this Alternative would not significantly impact recreation opportunities.

**Cultural Resources.** Cultural resources would be protected under all alternatives. If unanticipated cultural resources or sites are encountered during project work, work would be halted until the sites can be evaluated and protected.

**Aesthetics.** Short-term impacts from Alternative A or B would be minimal. Potential long-term impacts could be significant due to a continued high risk of wildfire. Depending on the location and extent of a wildfire, it could be visible to the general public. Most of the undesirable impacts related to the prescribed fire or shearblading under Alternative C are relatively short-term and would not be visible to the general public. Vegetation would flower and wildlife would return to the sheared areas in a relatively short amount of time. Long-term impacts from Forest Management activities would improve the visual appearance of the area. Smoke generated during the prescribed burns would be short-term and would not cause significant impacts to facilities on Clear AFS or the town of Anderson. Clearing of the recreational trails and construction of the wildlife viewing platform and recreational lodging would cause short-term unsightly views; however, the impacts would be short-term and are not visible to the general public. In the long-term the recreational trails, wildlife viewing platform, and recreational lodging would provide outdoor recreational benefits for personnel to enjoy the visual resources available on the installation.

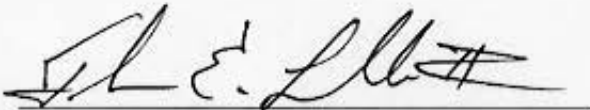
**Environmental Justice.** There would be no environmental justice impacts as a result of implementing any of the proposed alternatives.

**Petroleum, Oils, and Lubricants (POL).** Alternative A would have no impact on POLs since prescribed burns or shearblading would not occur. Alternative B would minimally impact environmental programs as power equipment would be used to clear secondary roads and firebreaks. Alternative C would not have any significant impacts to POL management on Clear AFS. The likelihood of any spills or leaks from equipment or from filling drip torches for the prescribed burns that could not be cleaned up or contained is considered small.

There would be no significant **cumulative impacts**.

## CONCLUSION

Based on the attached EA, I conclude that the environmental effects of the Proposed Action and Alternatives analyzed are not significant and the preparation of an EIS is not warranted.



THOMAS E. LOLLIS, Lt Col, USAF  
Commander

4 JUN 03

Date

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# EXECUTIVE SUMMARY



## EXECUTIVE SUMMARY

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This environmental assessment evaluates the potential environmental consequences for implementation of the Integrated Natural Resources Management Plan (INRMP) for Clear Air Force Station (AFS), Alaska. This environmental assessment facilitates environmental overview of integrated natural resource management elements and assists the installation in providing good stewardship of all natural and cultural resource assets found on Clear AFS. The objectives of the proposed implementation and integration of the Natural Resources Management Plan at Clear AFS are to: (1) provide the tools and the management intensity level that would allow for the effective ecosystem management of Clear AFS lands, (2) continue with mission support for the installation while implementing the INRMP, and (3) comply with Federal regulations and satisfy the requirements of environmental laws and procedures.

Three alternatives were analyzed in the environmental assessment. They include: Alternative A (No Action Alternative), Alternative B (Current Situation), and Alternative C (Proposed Action). Alternative C proposes a combination of high and medium intensity management levels for Clear's natural resources.

## ENVIRONMENTAL CONSEQUENCES OF IMPLEMENTING INRMP

The following resource areas were analyzed for potential environmental consequences associated with the Alternatives.

**Physical Resources.** Alternative A would minimally impact air quality, geological resources, soil, or water resources, but could result in significant long-term impacts to these resources due to a continued high risk of wildfires. Depending on the intensity of a wildfire, significant amounts of pollutants could be generated, as well as substantially increased soil erosion and sedimentation of surface water and wetlands. Short-term impacts to air quality, geological resources, soil, and water resources would not be significant from Alternative B. The long-term risk of wildfire would be slightly reduced through the maintenance of firebreaks. Proposed activities under Alternative C would generate increased criteria air pollutants, increase soil erosion and sedimentation, and result in minor changes to groundwater. The impacts would not be significant. As the proposed forest management activities are implemented, the risk of wildfire would be diminished. Other smaller projects would have minimal impacts on physical factors.

**Biological Resources.** Alternative A would implement the minimum military mission requirements; therefore, impacts to biological resources would not be significant. Alternative B would maintain the current, low-intensity management practices applied by Clear AFS and impacts would not be significant. Implementation of Alternative C would be beneficial to all biological resources on Clear AFS. Native vegetation would benefit from a Fire Management Plan, and the corresponding prescribed burning, as well as an Invasive Species Control Plan. Fisheries on Clear AFS would benefit from the proposed non-application of pesticides near lakes, fish stocking, and removal of pest fish species. An increase in native habitat, due to forest management practices, would benefit wildlife on the installation, while threatened and endangered species would be inventoried and

continue to be monitored under appropriate Federal and state regulations. Wetlands would benefit from an increased effort to preserve intact and undisturbed areas.

**Pest Management.** Alternatives A and B would not impact pest management or the physical and biological environment. Alternative C would result in long-term changes in pest management with minor impacts to the physical and biological environment. These impacts would not be significant.

**Outdoor Recreation.** Implementation of Alternative A would not effect outdoor recreation at Clear AFS. Minimal changes to outdoor recreation would occur under Alternative B. Alternative C would beneficially expand outdoor recreation opportunities at Clear AFS. Forest management activities under this Alternative would not significantly impact recreation opportunities.

**Cultural Resources.** Cultural resources would be protected under all alternatives. If unanticipated cultural resources or sites are encountered during project work, work would be halted until the sites can be evaluated and protected.

**Aesthetics.** Short-term impacts from Alternative A or B would be minimal. Potential long-term impacts could be significant due to a continued high risk of wildfire. Depending on the location and extent of a wildfire, it could be visible to the general public. Most of the undesirable impacts related to the prescribed fire or shearblading under Alternative C are relatively short-term and would not be visible to the general public. Vegetation would flower and wildlife would return to the disturbed areas in a relatively short amount of time. Long-term impacts from Forest Management activities would improve the visual appearance of the area. Smoke generated during the prescribed burns would be short-term and would not cause significant impacts to facilities on Clear AFS or the town of Anderson. Clearing of the recreational trails and construction of the wildlife viewing platform and recreational lodging would cause short-term unsightly views; however, the impacts would be short-term and would not be visible to the general public. In the long-term the recreational trails, wildlife viewing platform, and recreational lodging would provide outdoor recreational benefits for personnel to enjoy.

**Environmental Justice.** There would be no environmental justice impacts as a result of implementing any of the proposed alternatives.

**Petroleum, Oils, and Lubricants (POL).** Alternative A would have no impact on POLs since prescribed burns or shearblading would not occur. Alternative B would minimally impact POLs as power equipment would be used to clear secondary roads and firebreaks. Alternative C would not have any significant impacts to POL management on Clear AFS. The likelihood of any spills or leaks from equipment or from filling drip torches for the prescribed burns that could not be cleaned up or contained is considered small.

There would be no significant **cumulative impacts**.

# TABLE OF CONTENTS





## TABLE OF CONTENTS

---

EXECUTIVE SUMMARY.....	ES-1
LIST OF FIGURES.....	iv
LIST OF TABLES.....	iv
<b>1. PURPOSE AND NEED FOR ACTION.....</b>	<b>1-1</b>
1.1 LOCATION OF CLEAR AFS .....	1-2
1.2 LAWS AND REGULATIONS .....	1-2
1.2.1 Environmental Policy .....	1-2
1.2.2 Air Quality .....	1-2
1.2.3 Water Quality .....	1-4
1.2.4 Biological Resources .....	1-4
1.2.5 Cultural Resources .....	1-5
1.2.6 Public Health and Safety/Environmental Programs .....	1-5
1.2.7 Environmental Justice .....	1-5
1.3 PUBLIC REVIEW PROCESS .....	1-6
<b>2. DESCRIPTION OF THE ALTERNATIVES INCLUDING THE PROPOSED ACTION.....</b>	<b>2-1</b>
2.1 GROUNDS MANAGEMENT AND URBAN FOREST (LAND MGT) PLAN.....	2-4
2.1.1 High Intensity Management Action F-1 .....	2-4
2.1.2 Medium Intensity Management Action F-2 .....	2-5
2.1.3 Low Intensity Management Action F-3.....	2-6
2.1.4 No Action Alternative .....	2-6
2.2 WETLANDS MANAGEMENT .....	2-7
2.2.1 High Intensity Management Action W-1 .....	2-7
2.2.2 Medium Intensity Management Action W-2.....	2-7
2.2.3 Low Intensity Management Action W-3 .....	2-7
2.2.4 No Action Alternative .....	2-7
2.3 FISH AND WILDLIFE MANAGEMENT PLAN.....	2-7
2.3.1 High Intensity Management Action FW-1 .....	2-8
2.3.2 Medium Intensity Management Action FW-2.....	2-8
2.3.3 Low Intensity Management Action FW-3 .....	2-8
2.3.4 No Action Alternative .....	2-9
2.4 PEST MANAGEMENT.....	2-9
2.4.1 High Intensity Management Action P-1 .....	2-9
2.4.2 Medium Intensity Management Action P-2 .....	2-9
2.4.3 Low Intensity Management Action P-3.....	2-9
2.4.4 No Action Alternative .....	2-10
2.5 OUTDOOR RECREATION MANAGEMENT PLAN .....	2-10
2.5.1 High Intensity Management Action OR-1.....	2-10
2.5.2 Medium Intensity Management Action OR-2 .....	2-10
2.5.3 Low Intensity Management Action OR-3 .....	2-11
2.5.4 No Action Alternative .....	2-11

2.6	ALTERNATIVE A: NO ACTION .....	2-11
2.7	ALTERNATIVE B: CURRENT SITUATION .....	2-11
2.8	ALTERNATIVE C: PROPOSED ACTION .....	2-12
<b>3.</b>	<b>AFFECTED ENVIRONMENT.....</b>	<b>3-1</b>
3.1	PHYSICAL FACTORS .....	3-1
3.1.1	Climate.....	3-2
3.1.2	Air Quality .....	3-2
3.1.3	Geology and Topography .....	3-6
3.1.4	Soils .....	3-6
3.1.5	Groundwater .....	3-7
3.1.6	Surface Water .....	3-7
3.1.7	Floodplain.....	3-8
3.2	BIOLOGICAL RESOURCES .....	3-8
3.2.1	Vegetation.....	3-8
3.2.2	Wildlife.....	3-10
3.2.3	Threatened or Endangered Species, Species of Special Concern.....	3-12
3.2.4	Wetlands .....	3-13
3.3	PEST MANAGEMENT .....	3-14
3.4	OUTDOOR RECREATION.....	3-14
3.5	CULTURAL RESOURCES .....	3-14
3.6	AESTHETICS .....	3-15
3.7	ENVIRONMENTAL JUSTICE .....	3-17
3.8	PETROLEUM, OILS, AND LUBRICANTS .....	3-17
<b>4.</b>	<b>ENVIRONMENTAL CONSEQUENCES.....</b>	<b>4-1</b>
4.1	PHYSICAL RESOURCES .....	4-1
4.1.1	Potential Impacts on Air Quality .....	4-2
4.1.1.1	Analysis Methods .....	4-2
4.1.1.2	Potential Impacts of the Proposed Actions.....	4-2
4.1.1.3	Mitigation Measures.....	4-5
4.1.2	Potential Impacts on Geological Resources .....	4-5
4.1.2.1	Analysis Methods .....	4-6
4.1.2.2	Potential Impacts of the Proposed Actions.....	4-6
4.1.2.3	Mitigation Measures.....	4-9
4.1.3	Potential Impacts on Water Resources .....	4-9
4.1.3.1	Analysis Methods .....	4-9
4.1.3.2	Potential Impacts of the Proposed Actions.....	4-9
4.1.3.3	Mitigation Measures .....	4-12
4.2	BIOLOGICAL RESOURCES.....	4-12
4.2.1	Analysis Methods .....	4-12
4.2.2	Potential Impacts on Vegetation.....	4-12
4.2.3	Potential Impacts on Wildlife .....	4-14
4.2.4	Potential Impacts on Threatened & Endangered Species .....	4-16
4.2.5	Potential Impacts on Wetlands .....	4-17
4.2.6	Mitigation Measures .....	4-18
4.3	PEST MANAGEMENT .....	4-18
4.3.1	Analysis Methods .....	4-18

4.3.2	Potential Impacts of the Proposed Actions.....	4-18
4.3.3	Mitigation Measures .....	4-19
4.4	OUTDOOR RECREATION .....	4-19
4.4.1	Analysis Methods .....	4-19
4.4.2	Potential Impacts of the Proposed Actions.....	4-19
4.4.3	Mitigation Measures .....	4-20
4.5	CULTURAL RESOURCES.....	4-20
4.5.1	Analysis Methods .....	4-20
4.5.2	Potential Impacts of the Proposed Actions.....	4-20
4.5.3	Mitigation Measures .....	4-22
4.6	AESTHETICS .....	4-22
4.6.1	Analysis Methods .....	4-22
4.6.2	Potential Impacts of the Proposed Actions.....	4-22
4.6.3	Mitigation Measures .....	4-24
4.7	ENVIRONMENTAL JUSTICE.....	4-24
4.7.1	Analysis Methods .....	4-24
4.7.2	Potential Impacts of the Proposed Actions.....	4-24
4.7.3	Mitigation Measures .....	4-25
4.8	PETROLEUM, OILS, AND LUBRICANTS.....	4-25
4.8.1	Analysis Methods .....	4-25
4.8.2	Potential Impacts of the Proposed Actions.....	4-25
4.8.3	Mitigation Measures .....	4-26
4.9	COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS .....	4-26
4.10	RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY .....	4-26
4.11	CUMULATIVE IMPACTS .....	4-26
4.12	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES .....	4-27
5.	REFERENCES .....	5-1
6.	LIST OF PREPARERS AND CONTRIBUTORS.....	6-1
 <b>APPENDICES</b>		
APPENDIX A	Notice of Availability .....	A-1
APPENDIX B	Air Calculations.....	B-1

## LIST OF FIGURES

---

1.1-1	General Location of Clear AFS .....	1-3
3.1-1	Floodplains, Wetlands, and Proposed Action on Clear AFS .....	3-9
3.2-1	Plant Community Map of Clear AFS .....	3-11
3.5-1	Potential for Cultural Resources on Clear AFS .....	3-16

## LIST OF TABLES

---

2.1-1	Summary of Alternatives .....	2-1
3.1-1	NAAQS and AAAQS .....	3-3
3.1-2	Installation-Wide 1999 to 2000 Air Pollutant Emissions at Clear AFS .....	3-5
4.1-1	Estimated Emissions from the Proposed Actions .....	4-4
A-1	Air Emissions from Prescribed Burns .....	A-3
A-2	Air Emissions from Shearblading .....	A-5
A-3	Air Emissions from Shearblading and Burn Windrows Alternative .....	A-7

## **ACRONYMS AND ABBREVIATIONS**



## ACRONYMS/ABBREVIATIONS

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AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
AFI	Air Force Instruction
AFS	Air Force Station
AQCR	Air Quality Control Region
ARPA	Archaeological Resources Protection Act
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
CWA	Clean Water Act
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
°F	Degrees Fahrenheit
FONSI	Finding of No Significant Impact
HAP	Hazardous air pollutants
INRMP	Integrated Natural Resources Management Plan
km	Kilometers
mgd	Million gallons per day
MSL	Mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO <sub>2</sub>	Nitrogen dioxides
NO <sub>x</sub>	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O <sub>3</sub>	Ozone
Pb	Lead
PM <sub>10</sub>	Particulate matter 10 microns in diameter
PM <sub>2.5</sub>	Particulate matter 2.5 microns in diameter
POL	Petroleum, oils, and lubricants
ppm	Parts per million
PSD	Prevention of Significant Deterioration



SAIA	Sikes Act Improvement Amendment
SIP	State Implementation Plan
SO <sub>2</sub>	Sulfur dioxides
SO <sub>x</sub>	Sulfur oxides
SPRP	Spill Prevention and Response Plan
tpy	Tons per year
µg/m <sup>3</sup>	Micrograms per cubic meter
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile organic compounds

# **CHAPTER 1**

## **PURPOSE AND NEED FOR ACTION**



## 1. PURPOSE AND NEED FOR ACTION

---

The United States Air Force proposes to implement the Integrated Natural Resources Management Plan (INRMP) at Clear Air Force Station (AFS), Alaska. This environmental assessment (EA) will serve as the vehicle to integrate all natural resource management elements and provide good stewardship of all natural resource assets found on Clear AFS. A multiple use ecosystem management concept, as defined in Air Force Instruction (AFI) 32-7064, would be used to implement this stewardship and integrate the military mission and other uses with ecosystem conservation, while maintaining the biological diversity on Clear AFS lands. The purpose and need for implementing the INRMP is to provide organized management to all land resources within the confines of Clear AFS. Each management plan presents a comprehensive description of each resource and describes management activities and recommendations for the administration, operation, and conservation of the natural resources at Clear AFS. The objective of the five-year plan is to provide an updated account of the resources for future land planning.

The Clear AFS INRMP includes the following individual management plans:

- Ground Maintenance and Urban Forest Management (Land Management)
- Outdoor Recreation
- Fish and Wildlife Management

The objectives of the implementation and integration of the INRMP are to:

- Provide the tools and the management to allow for the effective ecosystem management of Clear AFS.
- Continue with mission support for the installation while implementing the INRMP.
- Comply with Federal and state regulations, and satisfy the requirements of environmental laws and procedures.

The *National Environmental Policy Act* (NEPA) of 1969, as amended, requires Federal agencies to consider environmental consequences in their decision-making process. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. The Air Force has prepared this EA through adherence to procedures set forth in the CEQ regulations (Title 40 *Code of Federal Regulations* (CFR) 1500 et seq.), and AFI 32-7061, as promulgated at 32 CFR Part 989 (*Air Force Environmental Impact Analysis Process*). These Federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation, designed to ensure deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action. This EA will facilitate decision-makers in making environmentally informed decisions in support of implementing the individual plans of the INRMP.

The *Sikes Act* (16 United States Code (U.S.C). 670a-670o, 74 Stat. 1052), as amended, Public Law 86-797, approved September 15, 1960, provides for cooperation by the Departments of the Interior and Defense with state agencies in planning, development, and

maintenance of fish and wildlife resources on military reservations throughout the United States. The Sikes Act Improvement Amendments (SAIA) requires U.S. Fish and Wildlife Service (USFWS) and State Fish and Game approval of an INRMP, as well as making the INRMP available for public comment. Since implementation of INRMPs may constitute a major Federal action or prescribe major Federal actions, this EA is being prepared to satisfy NEPA and the Sikes Act requirements.

## **1.1 LOCATION OF CLEAR AFS**

Clear AFS is located in east central Alaska approximately 80 miles southwest of Fairbanks in the Tanana Valley (see Figure 1.1-1). The installation is comprised of approximately 11,500 acres and is divided into three main areas: the Composite Area, where most administrative, recreational, and living quarters are located; the Camp Area, comprised of civil engineering, maintenance shops, and security police offices; and the Technical Site, for radar and related equipment. The developed portion of the facility covers approximately 3,800 acres. The installation is bordered to the east by the George Parks Alaska Highway, to the south by the Alaska Range, to the north by Lake Sansing and the community of Anderson, and to the west by the Nenana River. The installation can be accessed from the George Parks Highway, which is the main highway (State Highway 3) running between Anchorage and Fairbanks.

## **1.2 LAWS AND REGULATIONS**

A brief summary of Federal and state laws and regulations applicable to Federal projects are provided in the following paragraphs.

### **1.2.1 Environmental Policy**

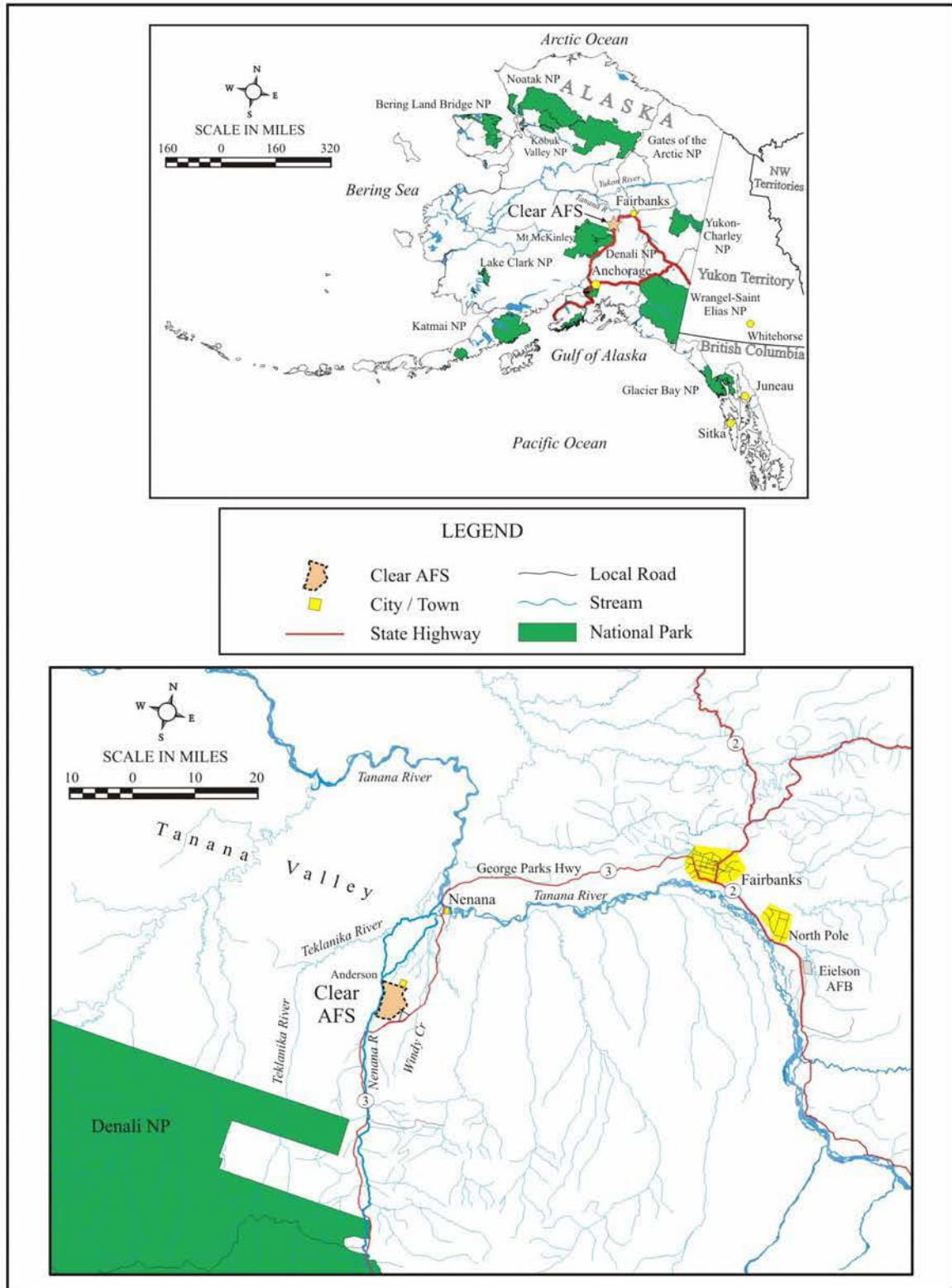
The *National Environmental Policy Act* of 1969 [42 U.S.C. Sec. 4321, et seq.] establishes national policy, sets goals, and promotes efforts, which will prevent or eliminate damage to the environment and biosphere. The NEPA process is intended to help public officials make decisions that are based on an understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. The process is also intended to provide information regarding the analyses of proposed major federal actions that may significantly affect the environment to the public [40 CFR Subsections 1500.1 and 1500.2].

32 CFR 989, *Environmental Impact Analysis Process* (EIAP), implements the Air Force EIAP and provides procedures for environmental impact analysis.

Executive Order (EO) 11514, *Protection and Enhancement of Environmental Quality*, as amended by EO 11991, sets the policy for directing the Federal Government in providing leadership in protecting and enhancing the quality of the nation's environment.

### **1.2.2 Air Quality**

The *Clean Air Act* (CAA) [42 U.S.C. Sec. 7401, et seq., as amended] establishes as federal policy the protection and enhancement of the quality of the Nation's air resources to protect human health and the environment. The CAA sets national primary and secondary ambient air quality standards as a framework for air pollution control.



**Figure 1.1-1. Location of Clear AFS**

The Alaska Administrative Code (AAC) [18 AAC 50] establishes provisions to identify, prevent, abate, and control air pollution in the State of Alaska. 18 AAC 50.300-50.305 establishes application procedures for construction-permit applicants.

AFI 32-7040, *Air Quality Compliance*, instructs the Air Force on compliance with the CAA, and federal, state, and local regulations.

### **1.2.3 Water Quality**

The *Clean Water Act* (CWA) [33 U.S.C. Sec. 1251, et seq., as amended] establishes federal limits, through the National Pollution Discharge Elimination System (NPDES), on the amounts of specific pollutants that are discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water. A NPDES permit, or modification to an existing permit, would be required for any change from the present parameters in the quality or quantity of wastewater discharge and/or storm water runoff.

40 CFR 112, *Oil Pollution Prevention*, establishes procedures, methods, equipment, and other requirements to prevent discharge of oil into waters of the United States. The regulations also establish criteria for determining adequate secondary containment.

18 AAC 70, *Water Quality Standards*, establishes provisions for the control of water pollution within the State of Alaska.

EO 11988, *Floodplain Management*, requires federal agencies to evaluate the potential effects of actions on floodplains and to avoid adverse floodplain impacts wherever possible.

AFI 32-7041, *Water Quality Compliance*, instructs the Air Force on how to assess, attain, and sustain compliance with the CWA and federal, state, and local environmental regulations.

### **1.2.4 Biological Resources**

The *Endangered Species Act* [16 U.S.C. Sec. 1531-1543] requires federal agencies that authorize, fund, or carry out actions to avoid jeopardizing the continued existence of threatened or endangered species and to avoid destroying or adversely modifying their critical habitat. Federal agencies must evaluate the effects of their actions on threatened or endangered species of fish, wildlife, and plants, and their critical habitats, and take steps to conserve and protect these species. All potentially adverse impacts to threatened and endangered species must be avoided or mitigated.

The *Sikes Act* [16 U.S.C. Sec. 670a-670o, 74 Stat. 1052] as amended, Public Law 86-797, approved September 15, 1960, provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the United States.

The *Migratory Bird Treaty Act* [16 U.S.C. Sec. 703-711] imposes substantive obligations on federal agencies to protect migratory birds and their habitats. This Treaty makes it illegal to possess, harass or destroy birds or their parts, including eggs, nests, feathers and young or injured birds.

11 AAC 95, *Alaska Forest Resources and Practices Regulations*, implements and interprets Alaska Statute 41.17 (Forest Resources and Practices) to provide protection of important public resources, maintain an economically viable timber industry, prevent or minimize significant adverse effects of soil erosion and mass wasting on water quality and fish habitat, and ensure reforestation to the fullest extent practical, taking into account the economic feasibility of timber operations.

AFI 32-7064, *Integrated Natural Resource Management*, provides the Air Force with guidance on compliance with the Endangered Species Act and federal, state, and local environmental regulations.

### **1.2.5 Cultural Resources**

The *National Historic Preservation Act* (NHPA) of 1966 [16 U.S.C. Sec. 470, et seq., as amended] requires federal agencies to determine the effect of their actions on cultural resources and take certain steps to ensure these resources are located, identified, evaluated, and preserved.

The *Archaeological Resources Protection Act* (ARPA) [16 U.S.C. Sec. 470a-11, as amended] protects archeological resources on federal lands. If archeological resources are discovered that may be disturbed during site activities, the Act requires permits for excavating and removing the resource.

AFI 32-7065, *Cultural Resource Management*, provides the Air Force with guidance on compliance with the NHPA, ARPA, and applicable federal, state, and local regulations.

### **1.2.6 Public Health and Safety/Environmental Programs**

The *Emergency Planning and Community Right-to-Know Act* (EPCRA) of 1986 [42 U.S.C. Sec. 11001, et seq.], sets forth the requirements for emergency planning, including timely notification and response to a release of hazardous substances.

### **1.2.7 Environmental Justice**

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, directs federal agencies to identify and address any disproportionately high and adverse human or environmental impacts of federal actions on minority or low-income populations.

Environmental Justice also takes into consideration EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which was signed by the President on April 21, 1997. This EO requires that each federal agency identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on children, who are more at risk because of developing body systems, comparatively higher consumption-to-weight ratios, behaviors that may expose them to more risks and hazards than adults, and less ability than adults to protect themselves from harm.



### **1.3 PUBLIC REVIEW PROCESS**

A Notice of Availability announcing the Draft EA and FONSI for public review was published in the Fairbanks Daily News-Miner on Sunday April 27, 2003 (see Appendix A). Copies of the Draft EA and FONSI were made available on the web at and at the Anderson Community Library (Anderson School) and Anderson City Building. The public comment period ran through May 27, 2003. No public comments were received.

## **CHAPTER 2**

### **DESCRIPTION OF THE ALTERNATIVES INCLUDING THE PROPOSED ACTION**



## 2. DESCRIPTION OF THE ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes alternatives or potential actions for the implementation and integration of the natural resources management plans for Clear AFS. The alternatives in this document have been developed from the various management plans. A brief description of the management plans and the natural resource projects identified under these plans, along with a discussion of three different management actions (high, medium, and low intensity levels) and No Action Alternative for each plan is provided to show how the alternatives considered in this EA were formulated. The alternatives considered in this EA are the No Action, Current Situation, and the Proposed Action. These descriptions precede the sections describing the actual alternatives. The natural resource projects described in the management plans include:

- Management of native ecosystems
- Fish stocking
- Invasive species inventory and control
- Wetlands inventory
- Alternate swallow nesting sites
- Forest stand inventory
- Threatened & endangered plant and wildlife species inventory
- Soil survey
- Development of a nature trail
- Wildlife viewing area and directional signs
- Prescribed burning with shearblading alternative
- Population assessment of fish species
- Fire management plan

Incremental levels of management activities, ranging from a High Intensity Management Level to a No Action Level were developed for each of the management plans. These levels of action consider minimum mission requirements and minimum regulatory concerns. These alternatives combine compatible ways of meeting goals and objectives and addressing the issues. These alternatives represent a combination of different levels of management activities for each management plan. The No Action Alternative for the management plans represents the minimum mission requirements under the existing environmental laws and Air Force directives. Table 2-1.1 shows the actions considered for the management plans and the Proposed Action for each plan.

Table 2-1-1 Summary of Alternatives					
	High Intensity	Medium Intensity	Low Intensity	No Action	Proposed Action
Resources	Actions				
Land Mgt.	Action F-1: Prescribed burns for management of native ecosystems. Conduct a Forest	Action F-2: Use a combination of prescribed burns, shearblading, and windrow burning for	Action F-3: Management of the forest would continue to be limited. Firebreaks would be	No land management activities would take place. Fire suppression	Action F-2

<p align="center"><b>Table 2-1-1</b> <b>Summary of Alternatives</b></p>					
	<b>High Intensity</b>	<b>Medium Intensity</b>	<b>Low Intensity</b>	<b>No Action</b>	<b>Proposed Action</b>
<b>Resources</b>	<b>Actions</b>				
	Stand Inventory. Firebreaks would be maintained. Develop a Fire Management Plan. Soil survey by USDA for entire property of Clear AFS.	management of native ecosystems. Conduct a Forest Stand Inventory. Firebreaks would be maintained. Develop a Fire Management Plan. Soil survey by USDA for entire property of Clear AFS.	maintained. Fire suppression as needed to protect property and human lives. Minimal ground maintenance such as removing debris and cleaning drainage ditches would be done on unimproved grounds.	would take place only as needed to protect property and human lives.	
<b>Wetlands</b>	<b>Action W-1:</b> All wetlands would be protected. Prescribed burns would be limited to non black pine areas. All wetlands would be delineated and mapped. No construction in or near wetlands would be permitted.	<b>Action W-2:</b> Protection of intact or relatively undisturbed wetlands. All wetlands would be delineated and mapped. Limited activities in or near wetlands. Acquire permits for actions in or near wetlands.	<b>Action W-3:</b> Limited activities in or near wetlands. Acquire permits for actions in or near wetlands.	Actions near or within jurisdictional wetlands would be discouraged. Permits would be acquired when needed. No wetland mitigation or restoration would occur.	Action W-2
<b>Fish, Wildlife, and T&amp;E</b>	<b>Action FW-1:</b> Construct alternative nesting sites for swallows/ use teflon strips or similar product to discourage swallows from nesting. Fish stocking. Provide improved wildlife habitat for moose and grouse through management of native ecosystems. Conduct threatened and endangered plant and wildlife species inventory. Conduct a population assessment of fish for management and monitoring for invasive and native fish species. Maximize hunting and fishing programs to generate revenues to support management.	<b>Action FW-2:</b> Use teflon strips or similar product to discourage swallows from nesting. Fish stocking. Provide improved wildlife habitat for moose and grouse through management of native ecosystems. Conduct threatened and endangered plant and wildlife species inventory. Maintain current fishing & hunting programs. Fishing and hunting fees would be required to obtain a permit. Collect trapping & hunting harvest reports. Conduct a population assessment of fish for management and monitoring for invasive and native fish species.	<b>Action FW-3:</b> Continue using data collected at neighboring installations to address the management of Clear's natural resources. Collect trapping & hunting harvest reports.	The Fish and Wildlife program would function only as direct mission support. Fishing and hunting permits would not be a source of revenue. A population assessment of fish would not be conducted and there would be no effort to discourage swallows from nesting.	Action FW-1

<p align="center"><b>Table 2-1-1</b> <b>Summary of Alternatives</b></p>					
	<b>High Intensity</b>	<b>Medium Intensity</b>	<b>Low Intensity</b>	<b>No Action</b>	<b>Proposed Action</b>
<b>Resources</b>	<b>Actions</b>				
	Collect trapping & hunting harvest report. Plan projects to enhance the natural habitat located along the Nenana River.				
<b>Pest Mgt</b>	<b>Action P-1:</b> Prepare an Invasive Species Inventory and Control Plan. No pesticide would be applied to any water courses or where it would contact T&E species. No aerial application. Place emphasis on more environmentally friendly pest program using biological practices.	<b>Action P-2:</b> Prepare an Invasive Species Inventory and Control Plan. No pesticide would be applied to any water courses or where it would contact T&E species. No aerial application. Use DoD approved pesticides.	<b>Action P-3:</b> Continue to follow criteria in accordance with AFSPC Small Installation Integrated Pest Management Plan. Implement pest management on an as needed basis.	Pest management control would be limited to mission critical areas.	Action P-1
<b>Outdoor Recreation</b>	<b>Action OR-1:</b> Construct a wildlife viewing area. Develop a nature trail. Modify existing programs to include hiking, cross-country skiing, bird watching, and photography. Construct cabins with complete services. Maintain current outdoor recreation programs.	<b>Action OR-2:</b> Construct a wildlife viewing area. Develop a nature trail. Maintain current outdoor recreation programs.	<b>Action OR-3:</b> Existing programs would continue. Cleanup secondary roads for use as recreational trails.	Existing programs would continue but no new programs would be developed. No nature trails or wildlife viewing areas would be constructed.	Action OR-1
<b>Cultural Resources</b>	<b>Action CR-1:</b> Develop a brochure providing base history and corresponding site map for self guided tour. Rehabilitation and renovation of buildings. Comply with relevant legislation. Maintain known cultural resources other than buildings.	<b>Action CR-2:</b> Rehabilitation and renovation of buildings. Comply with relevant legislation. Maintain known cultural resources other than buildings.	<b>Action CR-3:</b> Comply with relevant legislation. Maintain known cultural resources.	No maintenance would be preformed on buildings not used to meet mission goals.	CR-3

## **2.1 GROUNDS MANAGEMENT AND URBAN FOREST (LAND MANAGEMENT) PLAN**

The Grounds Management and Urban Forest Plan provides for the maintenance, protection, conservation, and management of Clear AFS land resources. The objectives of the plan are:

- Provide guidelines for revegetation of land
- Establish land maintenance procedures
- Outline fire suppression measures
- Prevent water, soil, and air pollution from land management practices
- Manage and protect wetlands and floodplains

Clear AFS forestry management practices are mainly directed toward the improved and semi-improved lands on the base. The use of several methods for management of resources in the unimproved areas of Clear AFS have been proposed and are assessed for potential impacts under the high and medium intensity management actions. Natural resource projects described in the INRMP that fall under the Grounds Management and Urban Forest Plan include prescribed burning, shearblading, forest stand inventory, soil survey, Fire Management Plan, and Wetlands Inventory (wetlands are discussed in Section 2.1.2).

### **2.1.1 High Intensity Management Action F-1**

This action proposes the use of prescribed burning for the management of unimproved forest areas and native ecosystems. Clear AFS has begun coordination with the Bureau of Land Management, the Division of Forestry, and the Alaska Department of Fish and Game to plan a prescribed burning program. A Fire Management Plan would be developed to determine a long-term strategy and respective responsibilities for fire management at Clear AFS. Prescribed burning is defined as the controlled application of fire to a specific land area to accomplish predetermined forest management objectives including hazard reduction, vegetation management, stand renewal, and ecosystem rehabilitation. All prescribed burns would be planned for and conducted following strict guidelines developed as part of the Fire Management Plan. The Plan would describe the planning process for prescribed burning and explain the content of the operational plan for conducting a specific prescribed burn and the process for agency and public notification. The direction of the plan would be to ensure all prescribed burns are conducted in a safe and efficient manner. The plan would comply with the Federal Wildland Fire Management Policy. A burn permit would be required from the Alaska Department of Natural Resources. The permit would list conditions for burning and requires burn-day notification so that wildland firefighters could be mobilized in an emergency.

Drip torches (containing a 5:1 mixture of diesel and gasoline) would be used to start the prescribed burns. The number of fires on the site that may be ignited or burned at one time would not be more than the number that a person patrolling the fires is able to take timely action in respect to preventing any of the fires from escaping. Clear AFS has approximately 9 miles of 40-foot wide primary and secondary roads that can be used as firebreaks. The installation Fire Department is responsible for fire protection along with

the Security Police who watch 24-hours per day for fires. A fire truck and personnel would be standing by at all times during ignition and active burning.

A forest stand inventory would be performed at Clear AFS for the unimproved areas. The inventory would assess the health of unimproved forest areas on the base and determine if disease and/or insect problems exist. The assessment would also identify potential fire hazards, areas that would benefit from prescribed burning, and the presence of noxious weeds and/or exotic plant species. Firebreaks would continue to be maintained. The U.S. Department of Agriculture (USDA) would conduct soil mapping to provide a characterization of soils at Clear AFS. The soil information will assist with land use planning and indicate limitations and hazards. This soil mapping is part of a larger survey effort by the USDA to map the Greater Nenana Area.

### **2.1.2 Medium Intensity Management Action F-2**

This alternative includes a combination of prescribed burning and shearblading with windrow burning. Prescribed burning would be accomplished as described under Action F-1. Shearblading would produce root sprouting from aspens thus increasing the stem production. The Alaska Fish and Game conducted a survey on Clear AFS and identified suitable sites for shearblading. Suitable sites for shearblading are those where mature aspen trees are judged to be growing sufficiently abundant and vigorous to produce sprouting from the root system of at least 12,500 stems per acre by the end of the second growing season. The stem density is the objective for producing brood habitat for ruffed grouse during roughly the second and third decade after disturbance in a boreal forest. The windrow burning would remove ground debris, thus promoting aspen growth.

To minimize impacts to the aspen root systems, all shearblading would occur during late winter when the ground is frozen. A shearblade is designed to ride on the soil surface without cutting into the soil. The purpose of shearing live trees is to favor root sprouting by quaking aspen so that aspen will regenerate at adequate density to produce good habitat for ruffed grouse, moose, and other wildlife species that use young deciduous forest. Pushing debris into windrows allows soils in the open swaths to be warmed by the sun and improves aspen sprouting from root stocks. Parallel windrows would be created after shearblading and would be approximately 30 feet wide leaving a buffer of 30 feet to the next windrow, comprising about 50 percent of the site. The Alaska Fish and Game would supervise all shearblading actions. The action would most likely be contracted out the first year, but could be conducted by Air Force personnel in subsequent years if funding becomes available for purchasing or renting shearblading equipment. Another option is that the Alaska Fish and Game has a shearblade that could be used free of charge by Clear AFS personnel for any cooperative habitat projects. Costs associated with this option would be transporting the shearblade from Delta Junction (approximately 175 miles) to Clear AFS and back.

Existing trails used for hunting and abandoned railroad grades would also be used for access to shearblading areas. When accessing a proposed shearblading site, the shearblade would be routed from the trail through the least dense vegetation to minimize disturbance to adjacent sites not being shearbladed. Typically a single blade width (12 to 14 feet) is



sheared of vegetation when accessing a proposed site to allow a pickup truck carrying fuel to service the bulldozers.

Debris not salvaged for firewood from the windrows would be left to decay over time or burned. If the windrows were burned, it would be done in late spring or early summer (after the snowmelt) when the debris has dried out. Burning of windrows would be accomplished in accordance with permit conditions described under Action F-1.

A forest stand inventory would be conducted as described in Section 2.1.1. The USDA would conduct soil mapping to provide a characterization of soils at Clear AFS. The soil information will assist with land use planning and indicate limitations and hazards.

### **2.1.3 Low Intensity Management Action F-3**

This action would provide continued maintenance of improved and semi-improved areas, but would limit unimproved area maintenance to the cleaning of drainage ditches and minimal removal of debris. Fire protection would be limited to fire suppression through the use of fire breaks (secondary and primary roads), requiring permits, and prevention inspections. This would occur mainly in improved and semi-improved areas. Management of the forest would continue to be limited.

### **2.1.4 No Action Alternative**

Under the No Action Alternative, no forest management activities would take place. Fire suppression would take place only as needed to protect property and human lives. Wildfire could still occur naturally, caused by lightning strikes from thunderstorms during dry seasons, or ignited by humans. The lack of action to reduce hazardous fuel loads increases risks to society and the environment. Risks include:

- Large destructive fires resulting from fuel accumulations
- Both firefighters and the public risk loss of life or serious injury
- Intense or long-lasting smoke caused by large uncontrolled fire can impact air quality and seriously affect respiratory health
- Destruction of valuable landscapes, private property, and natural resources
- Destruction of wildlife and their habitats
- Serious damage to soil, watersheds, and air quality

Due to the proximity of the Clear AFS facilities and the George Parks Alaska Highway, all unplanned fires that occur on Clear AFS lands would be aggressively suppressed using methods and means consistent with protecting lives, property, and minimizing smoke impacts.

## **2.2 WETLANDS MANAGEMENT**

The management of wetlands on Clear AFS falls under the Grounds Management and Urban Forest Plan. There are approximately 1,000 acres of wetlands within the boundaries of Clear AFS (USAF, 2002). As part of the Proposed Action, this acreage would be verified. Current wetland practices at Clear AFS include:

- Wetland delineation
- Regulatory compliance
- Wetland impact avoidance
- Preservation of existing wetlands

### **2.2.1 High Intensity Management Action W-1**

Under this action all wetlands would be protected, located, and classified as described in AFI 32-7064, Section 3.2. Forest management activities would be limited to non black pine areas. Construction activities in or near wetland areas would not be permitted. There would also be efforts made to preserve intact and undisturbed wetland areas on Clear AFS.

### **2.2.2 Medium Intensity Management Action W-2**

Intact or relatively undisturbed wetlands would be protected and preserved. All wetlands would be located and classified as described in AFI 32-7064, Section 3.2. Construction activities in or near wetlands would be limited and would require permits.

### **2.2.3 Low Intensity Management Action W-3**

Under this action there would be limited construction in or near potential wetland areas. Permits would be required for any action involving wetland areas.

### **2.2.4 No Action Alternative**

Actions in or near potential wetland areas would be discouraged but could occur with a wetland delineation and proper mitigation or restoration. A wetland inventory would not be completed.

## **2.3 FISH AND WILDLIFE MANAGEMENT PLAN**

The Fish and Wildlife Plan provides for the protection, conservation, and management of fish and wildlife resources, game and non game species, under the principles of multiple use and sustained yield within the limitations of the military mission requirements. The plan discusses potential mammal species residing on Clear AFS based on survey identifying habitats, which are likely to support and attract them. The plan uses existing migratory patterns of birds, and a survey of bird species done as part of the 1996 Biodiversity Study to identify potential bird species at Clear AFS. The fish species in the three man-made water resources at Clear AFS are assumed to be only the fish released during stocking events. The objectives of the plan are:

- Primarily the development of favorable habitat for native fish and wildlife species
- Secondly to make recreational opportunities available (hunting, fishing, bird watching, and nature photography)

Clear AFS fish and wildlife management practices are mainly directed toward coordinating multi-use with damage prevention of mission essential equipment taking priority. The use of several methods for management of fish and wildlife along with threatened and endangered species at Clear AFS have been proposed and are assessed for potential impacts under the four levels of management action.

### **2.3.1 High Intensity Management Action FW-1**

This action would include the management of migrating swallows by constructing alternative nesting sites away from buildings or use of Teflon strips to discourage swallows from nesting on buildings. Nesting structures would be made of a rough metal, sprayed with an Exterior Finishing and Insulation System for aesthetics, and attached to poles away from buildings using metal clamps or cables. The swallows are an asset because they feed on mosquitoes. The action would also include fish stocking and a population assessment of fish species inhabiting the cooling pond, Lake Sansing, and the open channel connecting the cooling pond to Lake Sansing. Netting and hook and line capture methods would be used as well as a capture/recapture schedule. This action would also maintain the efforts to monitor and maintenance of invasive and native fish species. Also, a phased native ecosystem management project on selected tracks of land would be initiated to provide moose and grouse habitat. An inventory of threatened and endangered plant and wildlife species would be conducted to re-evaluate and quantify species population on Clear AFS. This action would maximize the current fishing and hunting programs, which comply with both state and base permit requirements. The hunting and trapping harvest report program would be collected to provide additional wildlife information to assess trends in wildlife demographics. Projects would be initiated to enhance natural habitat along the Nenana River.

### **2.3.2 Medium Intensity Management Action FW-2**

This action would include the management of swallows as described in FW-1. Fish stocking and a population assessment would be conducted as described under Action FW-1. A phased native ecosystem management project on selected tracks of land would be initiated to provide moose and grouse habitat. A threatened and endangered species inventory would be conducted. This action would maintain the current fishing and hunting programs, which comply with both state and base permit requirements. There would also be use of hunting and trapping harvest programs to provide some information about the wildlife on Clear AFS. An inventory of threatened and endangered plant and wildlife species would be conducted to re-evaluate and quantify species population on Clear AFS.

### **2.3.3 Low Intensity Management Action FW-3**

Current hunting and fishing programs would be maintained at current levels along with the use of harvest reports.

### **2.3.4 No Action Alternative**

Under this action the permits would be required for hunting and fishing activities on Clear AFS in order to meet state and federal regulations. There would be no effort to collect harvest data or discourage swallows from nesting in building eaves.

## **2.4 PEST MANAGEMENT**

The primary objectives of the Pest Management Plan is to provide guidelines in the management and control of various pests that could adversely affect mission capability, health and morale of the personnel, and the overall appearance of Clear AFS. Clear AFS

has met all the Air Force Space Command criteria to qualify for an abbreviated plan for small installations. The purpose of the Pest Management Plan is to establish guidelines for the use of pesticides, and other pest management activities. The installation pesticides usage averages less than one pound each quarter per fiscal year. Clear AFS pest management practices are mainly directed toward elimination of pesticide use. Plan objectives are to conduct an Invasive Species Inventory and Control Plan to determine which exotic and invasive species are present on Clear AFS property and to create a plan to manage the species present on-site and to prevent additional species being introduced in the future.

#### **2.4.1 High Intensity Management Action P-1**

An Invasive Species Inventory and Control Plan would be completed at Clear AFS in an effort to provide more effective pest management. Pesticides would be used on improved and semi-improved area for weed control by certified personnel only. There would be aerial applications and no use of pesticides around the cooling pond, drainage ditch, and lake or where it could contact threatened or endangered species. Only locally grown plant species would be used for landscaping to minimize invasive species introductions and more emphasis would be placed on an environmentally friendly pest program using biological practices. Importance would be placed in a prevention program and all available measures would be taken to prevent non-targeted wildlife from pesticide exposure.

#### **2.4.2 Medium Intensity Management Action P-2**

An Invasive Species Inventory and Control Plan would be completed. Chemical control would be the primary method used but biological and mechanical methods could be applied in certain situations. No pesticide would be applied where it could come in contact with a threatened or endangered species. Pesticides used would be from the DoD approved list. The use of locally grown plant species for use in landscaping would occur in an effort to prevent new introduction and control existing invasive and exotic species.

#### **2.4.3 Low Intensity Management Action P-3**

Program emphasis would be placed in pest management control in the main base on an as needed basis. An Invasive Species Inventory and Control Plan would not be completed.

#### **2.4.4 No Action Alternative**

Under this action the Pest Management Plan would be limited to pest control in mission critical areas.

### **2.5 OUTDOOR RECREATION MANAGEMENT PLAN**

The purpose of the Outdoor Recreation Management Plan is to establish guidelines for the use, protection, and conservation of Clear AFS outdoor recreational resources. The plan discusses three categories of outdoor recreational areas. The Class I areas are those dealing with general outdoor recreation (3,000 acres) consisting of picnic areas, and water and winter sport sites usually in semi-improved area. The Class II areas are those dealing with natural environmental sites (6,000 acres), and support a diversity of activities varying

from hunting and fishing to hiking and mountain biking. These areas are mainly in unimproved areas of Clear AFS. Class III areas are those of special interest sites (1,856 acres) consisting of unique and irreplaceable attractions and features. The objectives of the plan are to:

- Provide the maximum outdoor recreational benefits within the constraints of the military mission and the capability of the available resources and preserve these resources for future generations
- Provide fishing, hunting, picnicking, skiing, hiking, trapping, off-road vehicle use, boating/canoeing, exercise trails and nature study to all persons desiring to use Clear's recreational resources, except where circumstances dictate otherwise
- Provide for safe recreational activities

### **2.5.1 High Intensity Management Action OR-1**

This action would involve the construction of cabins located near the composite area in an undeveloped forested section of the base to allow guests to enjoy a surrounding environment of green/nature. The action would also involve construction of a two-mile self-guided nature trail with interpretive signs to communicate information regarding the forest ecology of the region and enhance the non-motorized recreational uses of the land. A wildlife viewing platform would be constructed along the self-guided nature trail. Brush and natural vegetation would be removed from existing secondary roads around the base to improve their use as recreational trails. Several acres of land used for cross-country skiing could be enhanced by maintaining a network of ski trails and purchasing a cross-country ski tracking device. Because of its important role in military history during the Cold War, Clear may be of historical interest to personnel. A brochure would be developed to summarize the history of the site with a location map to allow visitors to identify buildings, and other points of interest. Maintain current Class I, II, and III recreation areas and programs at Clear AFS.

### **2.5.2 Medium Intensity Management Action OR-2**

This action involves the development of a marked nature trail and wildlife viewing area as described under Action OR-1. Brush would be removed from secondary roads, cross country skiing would be enhanced, and a history brochure would be developed as described under Action OR-1. Continue to maintain current Class I, II, and III recreation areas and outdoor recreation programs.

### **2.5.3 Low Intensity Management Action OR-3**

Existing outdoor recreation programs would be maintained along with Class I, II, and III areas. Secondary roads would be cleaned up as described under Action OR-1.

### **2.5.4 No Action Alternative**

Under this action existing outdoor recreation programs would continue but no new programs would be developed. Secondary roads would be maintained as needed for fire breaks. There would be no maintenance of any recreational areas except those in Class III areas as required under state and federal regulations.

## 2.6 ALTERNATIVE A: NO ACTION

The No Action Alternative would implement the minimum military mission requirements that would comply with regulatory and environmental statutes, laws, orders, and Air Force directives. This alternative does not provide for a pro-active environmental program. The following actions would occur under the No Action Alternative and are summarized in the table below.

- Maintenance of grounds would be limited to improved and semi-improved areas
- Fire suppression would take place only as needed to protect property and human lives
- Discourage activities from occurring in or near wetlands, but require proper permits to proceed with activities
- There would be no effort to quantify fish of different species or to monitor invasive species in Lake Sansing, the cooling pond, and the rejection ditch
- State permits for hunting and fishing would be required to comply with state laws.
- Pest management would be limited to mission critical areas
- Maintenance of outdoor recreational areas would be limited to Class III areas when required by law

<b>Alternative A: No Action</b>	
<b>Forestry</b>	No forest management activities would take place. Fire suppression would take place only as needed to protect property and human lives.
<b>Wetlands</b>	Actions near or within jurisdictional wetlands would be discouraged. Permits would be acquired when needed. No wetland mitigation or restoration would occur.
<b>Fish &amp; Wildlife</b>	The Fish and Wildlife program would function only as direct mission support. Installation fishing and hunting permits would not be required and permit fees would not be collected. A fish population assessment would not be conducted and there would be no effort to discourage swallows from nesting.
<b>Pest</b>	Pest management control would be limited to mission critical areas.
<b>Outdoor Recreation</b>	Existing programs would continue but no new programs would be developed. No nature trails or wildlife viewing areas would be constructed.

## 2.7 ALTERNATIVE B: CURRENT SITUATION

This alternative action would continue the direction provided by the current management activities. All of the management programs would continue to operate at their low intensity level (see Table 2.1-1). This Alternative would allow some improvements depending on availability of personnel and funds. Actions that would continue under this alternative are:

- Grounds maintenance of improved and semi-improved areas with debris removal and cleaning of drainage ditches in unimproved areas
- Fire suppression would occur only in improved and semi-improved areas or as needed to protect human life or property
- Construction activities would be limited in or near wetlands, requiring appropriate permits as needed
- Continue using data collected at neighboring installations to address the management of natural resources
- There would continue to be no use of pesticides near any of the surface water areas

- Pesticides would be used in improved areas to control weeds
- Only locally grown plants would be used for landscaping
- Maintenance of current general outdoor recreation areas would occur, along with the clean up of secondary roads for recreational trail uses

<b>Alternative B: Current Situation</b>	
<b>Forestry</b>	Forest Stand Inventory performed, continued maintenance of improved and semi-improved lands, minimal removal of debris and cleaning of drainage ditches on unimproved lands, fire suppression only in improved and semi-improved areas
<b>Wetlands</b>	Limited activities in or near wetlands, acquire permits for actions in or near wetlands
<b>Fish and Wildlife</b>	Continue using data collected at neighboring installations to address the management of natural resources.
<b>Pest</b>	Use of pesticides in improved land areas to control weeds, use only locally grown plant species for landscaping.
<b>Outdoor Recreation</b>	Maintenance of current facilities for general outdoor recreation areas, Cleanup of secondary roads for recreational trail uses

## 2.8 ALTERNATIVE C: PROPOSED ACTION

This action would implement a combination of high and medium intensity management levels for Clear's natural resources. This alternative represents the best possible combination of activities. Priority would be given to the implementation of projects proposed for the next couple of years, which would pertain mainly to fish and wildlife management and forestry management. The proposed action would involve:

- A combination of prescribed burns and shearblading for native ecosystem management
- Grounds maintenance of improved and semi-improved areas would continue along with a forest stand inventory in the unimproved areas
- Fire management plan would be developed
- Wetlands inventory would occur to assist in the preservation and conservation of intact and undisturbed wetlands
- Soil survey would be involved assisting in identification of potential land uses and improve management practices
- Limiting activities in or near wetlands, with appropriate permits
- There would be inventories done for fish, and threatened and endangered plant and wildlife species
- Assessment of fish population would provide monitoring for invasive fish species.
- A single fish stocking event would occur at Lake Sansing
- Fishing and hunting programs would continue, monitored by trapping and hunting harvest reports
- There would be emphasis on using biological practices for management of pest species and no use of pesticides at all around surface water
- Invasive species inventory and control plan would be developed. Control efforts would be assisted by use of only locally grown plant species for landscaping

- There would be construction of a wildlife viewing area connected to development of a marked nature trail
- Promotion of organized outdoor activities and maintenance of current general outdoor recreation area would occur

<b>Alternative C: Proposed Action</b>	
<b>Forestry</b>	Use a combination of prescribed burns, shearblading, and windrow burning for management of native ecosystems. Conduct a Forest Stand Inventory. Firebreaks would be maintained. Develop a Fire Management Plan. Soil survey to define construction limitation and improve management practices.
<b>Wetlands</b>	Aggressive protection of intact or relatively undisturbed wetlands. All wetlands would be delineated and mapped. Limited activities in or near wetlands. Acquire permits for actions in or near wetlands.
<b>Fish and Wildlife</b>	Construct alternative nesting sites for swallows. Fish stocking. Provide improved wildlife habitat for moose and grouse through management of native ecosystems. Conduct threatened and endangered plant and wildlife species inventory. Conduct a population assessment of fish for management and monitoring for invasive and native fish species. Maximize hunting and fishing programs to generate revenues to support management. Collect trapping & hunting harvest report. Plan projects to enhance the natural habitat located along the Nenana River.
<b>Pest</b>	Prepare an Invasive Species Inventory and Control Plan. No pesticide would be applied to any water courses or where it would contact T&E species. No aerial application. Place emphasis on more environmentally friendly pest program using biological practices.
<b>Outdoor Recreation</b>	Construct a wildlife viewing area. Develop a nature trail. Modify existing programs to include hiking, cross-country skiing, bird watching, and photography. Construct cabins with complete services. Maintain current outdoor recreation programs.



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# **CHAPTER 3**

## **AFFECTED ENVIRONMENT**



### 3. AFFECTED ENVIRONMENT

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This chapter describes the affected environment at Clear AFS (as appropriate), providing baseline information to allow the evaluation of potential environmental impacts that could result from the Proposed Action, Current Situation, and the No Action Alternative. As stated in 40 CFR Sec. 1508.14, the human environment includes natural and physical resources and the relationship of people to those resources. The environmental baseline resource areas described in this chapter were selected after identifying the potential issues and concerns of implementing the INRMP. In accordance with 40 CFR Sec. 1502.15, the resource areas that would not be impacted are not carried forward for further analysis. These resource areas are listed below, with a brief explanation for their omission from the analysis.

- **Noise.** There are no current noise issues at Clear AFS. Noise would temporarily increase during implementation of some of the natural resource projects; however, there are no nearby inhabitants that would be affected. The temporary increase in noise would be minimal and spread out over a five-year period. Therefore, noise impacts are not considered significant and will not be further analyzed in this EA.
- **Transportation.** Transportation will not be analyzed since there are no current traffic problems on the installation. Only a small number of worker vehicles and equipment would be required to implement the natural resource projects and the projects would be spread over a five-year period. Activities associated with these projects are considered to be minor with only a small number of contracted personnel required. These workers would likely be from the local area. Transportation impacts are not considered significant and will not be further analyzed in this EA.
- **Socioeconomics.** There would be slight, but beneficial increases in the local economy from implementation of the natural resource projects. The workers would most likely be from the local area so there would be no influx in personnel or housing required. Therefore, population, local economy, and housing will not be discussed further in this EA.

The resource areas that may be impacted by the Proposed Action, Current Situation, and No Action Alternative include physical factors (air quality, geology, soils, and water), biological factors (vegetation, wetlands, fish and wildlife, threatened and endangered species), pest management, outdoor recreation, cultural resources (historic architectural resources and archaeological resources), aesthetics, environmental justice, and petroleum, oils, and lubricants (spill response and fuel storage tanks).

#### 3.1 PHYSICAL FACTORS

Physical factors discussed in this section include climate, air quality, geology, soils, groundwater, and surface water.

### 3.1.1 Climate

Clear AFS has a continental or subarctic climate characterized by long cold winters, short mild summers, and noticeable changes in the daily weather pattern throughout the year. Temperature averages in interior Alaska range from approximately 60 degrees Fahrenheit (°F) in July to approximately -12°F in January. Temperature extremes can vary from a high of almost 100°F in the summer to -60°F in the winter. Mean annual precipitation is approximately 13 inches, with the majority occurring in the July through September timeframe. Snowfall averages about 45 inches per year, primarily from October through March. Although wind information is not recorded at Clear AFS, winds in interior Alaska are relatively gentle. The nearest sites where wind data is collected are Fairbanks (about 56 miles northeast), Eielson Air Force Base (about 68 miles northeast), and Healy (about 30 miles south). Wind data recorded at Healy show prevailing winds are from the south-southeast, with a secondary prevalence from the northwest generally ranging between 5 and 13 miles per hour. These directions are roughly the orientation of the Nenana River Valley and demonstrate the funneling effect of the local mountain topography (USAF, 2000a). Predominant winds at Eielson Air Force Base vary from south to north to west during different parts of the year. Wind speeds are generally between 1 and 5 miles per hour, with maximum gusts up to 74 miles per hour.

### 3.1.2 Air Quality

The National Ambient Air Quality Standards (NAAQS), established by the United States Environmental Protection Agency (USEPA), and adopted by the Alaska Department of Environmental Conservation define the maximum allowable concentrations of pollutants that may be reached but not exceeded within a given time period. These standards were selected to protect human health with a reasonable margin of safety. Section 110 of the CAA requires states to develop air pollution regulations and control strategies to ensure that state air quality meets the NAAQS established by USEPA. These ambient standards are established under Section 109 of the CAA, and they currently address six criteria pollutants. These pollutants are: carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), particulate matter, and sulfur dioxide (SO<sub>2</sub>). Each state must submit these regulations and control strategies for approval and incorporation into the Federally enforceable State Implementation Plan (SIP). Exceeding the concentration levels within a given time period is a violation and constitutes a nonattainment of the pollutant standard. Emissions of air pollutants in Alaska are limited to the more restrictive Federal or state standard.

Particulate matter has been further defined by size. There are standards for particulate matter smaller than 10 microns in diameter (PM<sub>10</sub>) and smaller than 2.5 microns in diameter (PM<sub>2.5</sub>). Implementation of the PM<sub>2.5</sub> standards are being reviewed by the USEPA. Table 3.1-1 presents the current NAAQS and Alaska Ambient Air Quality Standards (AAAQS) for the six criteria pollutants. In addition to the six criteria pollutants, Alaska has standards for reduced sulfur and ammonia.

All areas of the country are classified as attainment, nonattainment, or unclassifiable. Areas which meet the national primary and secondary ambient air quality standards are classified as attainment. Any area that does not meet (or that contributes to ambient air

quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for any criteria pollutant is designated as nonattainment.

<b>Table 3.1-1</b> <b>National Ambient Air Quality Standards (NAAQS)</b> <b>and Alaska Ambient Air Quality Standards (AAAQS)</b>				
<i>Pollutant</i>	<i>Averaging Time</i>	<i>NAAQS</i> <i>µg/m<sup>3</sup> (ppm)<sup>a</sup></i>		<i>AAAQS</i> <i>µg/m<sup>3</sup> (ppm)<sup>a</sup></i>
		<i>Primary<sup>b</sup></i>	<i>Secondary<sup>c</sup></i>	
O <sub>3</sub>	1 hr 8 hr	235 (0.12) <sup>d</sup> 157 (0.08)	Same same	235 (0.12) None
CO	1 hr 8 hr	40,000 (35) 10,000 (9)	None none	40,000 (35) 10,000 (9)
NO <sub>x</sub>	AAM <sup>f</sup>	100 (0.053)	same	100 (0.053)
SO <sub>x</sub>	3 hr 24 hr AAM	None 365 (0.14) 80 (0.03)	1,300 (0.5) none none	1,300 (0.5) 365 (0.14) 80 (0.03)
PM <sub>10</sub>	AAM 24 hour	50 150	Same same	50 150
PM <sub>2.5</sub>	AAM 24 hr	65 15	Same same	None None
Pb	¼ year	1.5	same	1.5
Reduced Sulfur <sup>g</sup>	30-minute	None	None	50 (0.02)
Ammonia	8-hour	None	None	2.1 (3.0)

<sup>a</sup>µg/m<sup>3</sup> — micrograms per cubic meter; ppm — parts per million

<sup>b</sup>National Primary Standards establish the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

<sup>c</sup>National Secondary Standards establish the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impacts on the environment.

<sup>d</sup>On June 5, 1998 EPA issued the final rule identifying areas where the 1-hour national ambient air quality standard (NAAQS) for ozone is no longer applicable because there has been no current measured violation of the 1-hour standard in such areas. This has been reinstated while the 8-hour standard is under U.S. Supreme Court review. The State of Alaska has retained a 1-hour standard of 235 µg/m<sup>3</sup>.

<sup>e</sup>mg/m<sup>3</sup> milligrams per cubic meter.

<sup>f</sup>AAM — Annual Arithmetic Mean.

<sup>g</sup>Measured as Sulfur Dioxide.

PM<sub>10</sub> is particulate matter equal to or less than 10 microns in diameter

PM<sub>2.5</sub> is particulate matter equal to or less than 2.5 microns in diameter. This standard has not yet been implemented and is presented here for informational purposes only.

Source: 40 CFR 50.9; 18 AAC 50

The USEPA has established Air Quality Control Regions (AQCR) throughout the United States. Clear AFS is located within the Northern Alaska Intrastate AQCR. Clear AFS is in attainment for all NAAQS and AAAQS (USAF, 2000a; USEPA, 2000). Fairbanks, located about 60 miles to the northeast of Clear, is in nonattainment for CO. If a major source is located within 10 kilometers (6 miles) of a nonattainment area, it must meet the requirements of 18 AAC 50.300e for conformity with the SIP for the nonattainment area.

Generally, criteria pollutants directly originate from mobile and stationary sources. Tropospheric O<sub>3</sub> is an exception, since it is rarely directly emitted from sources. Most O<sub>3</sub> forms as a result of volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>) reacting with sunlight. In 1997, an eight-hour average standard of 0.08 parts per million (ppm) was adopted to replace a one-hour standard. The one-hour standard for ozone of 0.12 ppm was retained as a transition to the new eight-hour standard for those areas that were in nonattainment. On June 5, 1998, the USEPA issued the final rule identifying areas where the one-hour NAAQS for ozone is no longer applicable because there had been no violation of the one-hour standard in such areas in the last three years. While the eight-hour standard was under review by the U.S. Supreme Court, the one-hour standard was reinstated. The State of Alaska has also retained a one-hour standard of 235 micrograms per cubic meter (µg/m<sup>3</sup>); this is equivalent to 0.12 ppm.

The quality of air affects visibility in mandatory prevention of significant deterioration (PSD) Class I Federal areas where visibility is an important value. PSD regulations (40 CFR Sec. 52.21) define air quality levels that cannot be exceeded by major stationary emission sources in specified geographic areas. The PSD regulations establish limits on the amounts of sulfur dioxide (SO<sub>x</sub>) and total suspended particles that may be emitted, above a premeasured amount, in each of the class areas. Class I areas are pristine areas, and include national parks and wilderness areas. All other areas in the United States are Class II areas, where moderate, well-controlled industrial growth could be permitted. Denali National Park is a Class I PSD area, located 16 miles south of Clear AFS. No other Class I areas are within 100 kilometers (km) (62 miles) of Clear AFS. Alaska also protects visibility in two specific areas (e.g., visibility protection areas), as defined in 18 AAC 50.025. The visibility protection areas (Mount Deborah as seen from the Savage River Campground, and Mt McKinley (Denali) as seen from Wonder Lake) are considerable distances away from Clear AFS. The Savage River Campground is about 30 miles from Clear AFS, and Mount Deborah is about 55 miles southeast of Clear AFS. Wonder Lake is about 35 miles south of Clear AFS, and Mt McKinley is about 65 miles south of Clear AFS.

Open burning is regulated under 18 AAC 50.065. The regulations are designed to minimize visibility problems, as well as control the burning. Open burning must meet the following requirements:

- (1) the material is kept as dry as possible through the use of a cover or dry storage;
- (2) before igniting the burn, non-combustibles are separated to the greatest extent practicable;
- (3) natural or artificially induced draft is present;
- (4) to the greatest extent practicable, combustibles are separated from grass or peat layer; and
- (5) combustibles are not allowed to smolder.

The principal source of CO and SO<sub>x</sub> is combustion. The precursors of O<sub>3</sub> (VOC and NO<sub>x</sub>) are also primarily emitted from combustion. Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) is generated during ground-disturbing activities and during combustion. In accordance with

18 AAC 50.045, a person who causes or permits bulk materials to be handled, transported, or stored, or who engages in an industrial activity or construction project shall take reasonable precautions to prevent particulate matter from being emitted into the ambient air. These requirements apply during site grading, demolition, and transportation of materials.

Clear AFS completed an Air Emissions Inventory for July 1999 to July 2000 (USAF, 2000c). The installation-wide criteria pollutant totals are shown in Table 3.1-2. The base has a Clean Air Act Title V Operating Permit from the Alaska Department of Environmental Conservation valid until January 2005 (USAF, 2000a). Any stationary source of air pollutants which emits, or has the potential to emit, 100 tons per year (tpy) or more of any pollutant regulated under the CAA is a major stationary source. Clear AFS is a major stationary source, as the emissions and the potential to emit (the maximum emissions that equipment can produce under permit limitations and operational capacity) of several regulated pollutants is 100 or more tpy (see Table 3.1-2) (USAF, 2000a). Therefore, the installation is subject to PSD review requirements of 40 CFR Sec. 52.21 and 18 AAC 50.300c for modifications to stationary sources which would increase emissions of pollutants. As discussed above, temporary construction activities which would not require a construction permit are exempt from this requirement. The coal-fired boilers for the power plant are the main source of criteria pollutant emissions at the base, generating more than 90 percent of the PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub>, and CO emissions. Another substantial source of PM<sub>10</sub> is vehicle travel on unpaved roads. The 1999 Air Emissions Inventory estimated fugitive dust (PM<sub>10</sub>) from vehicles on unpaved roads at 9.62 tpy.

<b>Table 3.1-2</b> <b>Installation-Wide July 1999 to July 2000 Air Pollutant Emissions at Clear AFS</b> <b>(values in tons per year)</b>					
<i><b>Emissions</b></i>	<i><b>PM<sub>10</sub></b></i>	<i><b>NO<sub>x</sub></b></i>	<i><b>SO<sub>x</sub></b></i>	<i><b>CO</b></i>	<i><b>VOCs</b></i>
Stationary Source Emissions	63.90	477.33	230.53	216.69	17.95
Potential to Emit	184.63	983.80	465.34	446.51	23.57
Source: USAF, 2000a					

Hazardous air pollutants (HAP) include a wide range of materials or chemicals that are toxic or potentially harmful to human health. A major source of HAPs is defined as the potential to emit greater than 10 tpy of any single HAP or 25 tpy of total HAPs (Clean Air Act Title I, Part A, Section 112). Clear AFS is a major source of HAPs, primarily due to hydrogen chloride emissions from the power plant. HAPs are found in numerous products and used in many processes, but few types and small amounts of HAPs are generated during internal combustion processes or earth-moving activities.

The area around Clear AFS is generally sparsely populated. The nearest town is Anderson, located about five miles north of the main part of Clear AFS (about two miles north of the Station boundary). Other towns include Healy, about 30 miles south of Clear, and Nenana, about 17 miles north of Clear.



### 3.1.3 Geology and Topography

Geological resources include physical features of the earth such as geology (surface and subsurface features), topography, and seismic events within the vicinity of Clear AFS.

Clear AFS is located in the Yukon Region of interior Alaska near the southern boundary of the Tanana-Kuskokwim Lowland (USGS, 1999a). The Lowlands are a broad, relatively flat valley filled with glacial meltwater outwash. The outwash is a wedge-shaped fan, sloping downward from the south (the source of the outwash) to the north, the direction of flow of the Nenana River. The Nenana River breached a well-defined terminal moraine and deposited coarser gravels in an arc making up the inner fan closest to the breach, and deposited medium gravels in a middle fan further out. Clear AFS is situated on the east half of the fan and is covered with many interlaced sinuous channels, terraces, and banks that formed during glacial meltwater outwash deposition. Local elevation differences of these features are 2 to 6 feet. The sediments deposited by the Nenana River consist primarily of medium to coarse granite and conglomerate gravel, covered by sandy gravel, sand, and silt. These sediments can be several hundreds of feet thick (USAF, 1996).

The Northern Foothills begin to rise to elevations up to 5,000 feet above mean sea level (MSL) about 17 miles south of Clear AFS. About 50 miles south of Clear AFS, the Alaska Range rises in elevation up to 20,320 feet at Mount McKinley. Elevations range from about 650 feet above MSL at the southern edge of the installation to about 550 feet above MSL near the northern edge of Clear AFS. Slopes are to the north at 25 feet per mile (about 0.5 percent slope).

The boundary between the Tanana Valley and Alaska Range foothills is very abrupt and is marked by the Denali Fault. This active fault can generate earthquakes as great as 8.1 magnitude on the Richter Scale (USGS, 1999b). Lateral thrust motion along the fault in recent millennia has been about 2.5 centimeters per year. Clear AFS, located about 50 miles north of this fault, is located in Seismic Zone 3 (USAF, 1992). This is an area where earthquakes range from 5.5 to 6.5 magnitude (a seismic event of VIII on the Modified Mercalli Scale). Moderate damage can occur in normal structures, while damage is slight in well-built structures. There have been 32 earthquakes with a magnitude of 5.5 or greater since 1904 within a 100-mile (160-km) radius of Clear. Four of these quakes have occurred since 1990 (USGS, 2001).

### 3.1.4 Soils

Soils on the installation are of unknown age but have weathered in place with few, if any, geomorphic rejuvenating events or processes since the Pleistocene glaciation (about 10,000 years ago). Silty soils generally occur in areas dominated by deciduous forest (aspen and birch); these soils vary from 2½ to 6 feet deep and are underlain by a sandy gravel horizon varying from 6 to 30 feet. Areas dominated by spruce are generally covered by a peat layer ½ foot thick over a silt horizon that varies from 2½ to 4½ feet in depth. Under this horizon are horizons of sand, silt, and gravel combinations (USAF, 1996). Silty soils of the installation are generally well drained although drainage may be impeded in some areas by intermittent pockets of permafrost. Bore holes drilled near Clear AFS in 1947 detected permafrost at depths between 40 and 50 feet (USAF, 1999c). Permafrost has been detected at a depth of 49 feet several miles north of Anderson, but was not detected to a depth of

123 feet in another nearby location (USAF, 2002). Areas covered by peat are more susceptible to permafrost, which may go below 25 feet, and drainage is poor. Soils on Clear AFS have a low potential for erosion. Erosion is also minimized by vegetative cover and low annual precipitation. The pH of the soil in well-drained sites (i.e., silty soils) is 5.0 to 6.0. In poorly drained sites (i.e., peat), the pH of the surface is 4.0 to 5.5 and the subsoil is 5.0 to 6.0 (USAF, 1996). The low pH limits the soil development process and potential recovery from human impacts.

Compaction, and its effect on permeability, varies according to soil type. Silty soils are moderately compressible and have low to medium permeability after compaction. Sandy silt soils are slightly to moderately compressible and have low permeability after compaction. Well-graded gravel and sand are only slightly compressible and are highly permeable after compaction.

### **3.1.5 Groundwater**

Groundwater at the installation flows in a northerly direction and is found in an unconfined aquifer composed of unconsolidated sand and gravel. Groundwater discharges about five miles north of Clear AFS into Julius and Clear Creeks. Depth to groundwater ranges from approximately 20 to 100 feet below the surface in the developed areas of the installation (USAF, 1997). Groundwater in the area is recharged from infiltration of the Nenana River, other surface water, and precipitation. The water table is a couple feet below ground surface near the Nenana River, and gradually extends deeper northeastward toward the developed portion of the installation. Groundwater flow is north-northeast, with a water table gradient of about 3 feet per mile (USAF, 1997). The water supply for Clear AFS is provided by 19 wells that are approximately 150 feet deep. Water quality is very good; chlorination is the only method of groundwater treatment needed for domestic use (including human consumption, food preparation, and fire protection).

### **3.1.6 Surface Water**

Clear AFS lies within the Tanana River basin and is drained to the north by the Nenana River, a major tributary to the Tanana River that forms the western boundary of the installation. The Nenana River is glacier-fed, silty, and turbid, and experiences major seasonal water-level fluctuations. The river gradient decreases just upstream from Clear AFS, and near the installation the river is characterized by broad, slow-moving flow and braided channels. There are no natural streams, ponds, or lakes on Clear AFS. Runoff drains to the north via several small creeks north of Clear AFS that flow into the Nenana River. There are no known private water supply intakes in streams within 15 miles downstream from Clear AFS and no municipal intakes on the Nenana River or Tanana Rivers within 150 miles from Clear AFS (USAF, 1999b).

Two man-made water bodies, Lake Sansing and the power plant cooling pond, are located on Clear AFS. A reject ditch (open channel) carries water from the power plant to Lake Sansing. Lake Sansing covers 12 acres and is an old gravel pit excavated in the late 1950s that receives water discharges from the Power Plant and Solid State Phased-array Radar Facility.

The cooling pond is a seven-acre lined reservoir that receives water through an underground pipe from the power plant. Water used for cooling purposes in the power plant is circulated through the cooling pond by gravity flow, taking approximately 24 hours to return to the plant. The power plant groundwater wells generally withdraw about 4 to 5 million gallons per day (mgd) of their maximum capacity of approximately 8.6 mgd. The power plant reject ditch was created during construction of the power plant in the 1950s to allow excess cooling water from the cooling pond or directly from the plant to overflow into Lake Sansing. The reject ditch connects the power plant in a straight line, northwest into Lake Sansing. The reject ditch is 9 to 15 feet wide, 5 to 15 feet deep, and 1 mile long.

Clear AFS is currently operating under a NPDES stormwater permit. An application for a NPDES wastewater permit was completed in November 2000 to cover outfalls to Lake Sansing.

### **3.1.7 Floodplain**

Floodplains are regulated by EO 11988 (*Floodplain Management*). Federal agencies are required to protect values and benefits of floodplains and reduce risks of flood losses by not conducting or allowing activities within floodplains, unless there is no other practicable alternative. If avoidance to floodplains is not feasible, in order for the project to proceed, the chairman of the MAJCOM Environmental Protection Committee/Environmental, Safety, and Occupational Health Committee must approve a Finding of No Practicable Alternative in accordance with EO 11988. A Finding of No Practicable Alternative must be prepared and public notice of intent must be made before proceeding with the project.

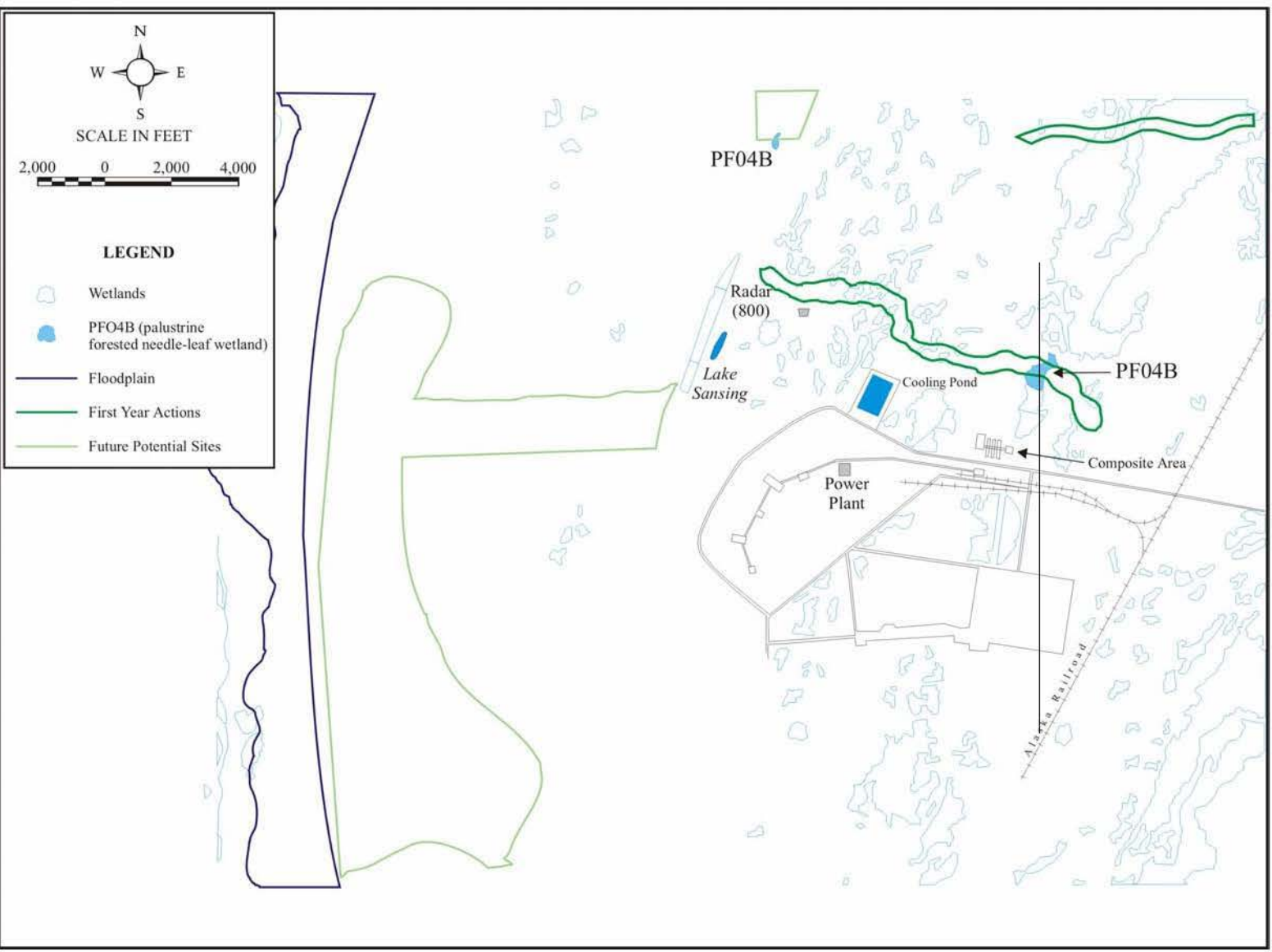
The 100-year floodplain of the Nenana River is restricted to the westernmost portion of the installation in undeveloped areas (see Figure 3.1-1). Approximately 1,100 acres, or 10 percent of the undeveloped acreage of the installation, is within the Nenana River floodplain. Figure 3.1-1 shows the floodplain in relation to the proposed prescribed burn/shearblading areas.

## **3.2 BIOLOGICAL RESOURCES**

Biological resources include the native and introduced plants and animals that make up natural communities. Natural communities are closely linked to the climate and topography of the area, and change according to the season. In 1995, a biodiversity study was conducted at Clear AFS to determine the presence and habitat relationships of plant and bird species (USAF, 1996). The discussion of biological resources is separated into five topics: vegetation, wildlife, threatened or endangered species and species of special concern, wetlands, and pest management.

### **3.2.1 Vegetation**

Clear AFS is located on relatively flat terrain with a regional slope of 25 feet to the mile in a northerly direction. Original vegetation of the installation was altered by wildfire just before construction of the installation in 1959. Small stands of white spruce (*Picea glauca*) and black spruce (*Picea mariana*) escaped the wildfires and reflect original forest stands (USAF, 2002). Several mixed forest stands of spruce, paper birch (*Betula*



**Figure 3.1-1. Floodplain, Wetlands and Proposed Action at Clear AFS**

*papyrifera*) and quaking aspen (*Populus tremuloides*) also inhabit the installation. Along the Nenana River floodplain, species such as balsam poplar (*Populus balsamifera*), white spruce, bristly rose (*Rosa acicularis*), American green alder (*Alnus crispa*), false toadflax (*Geocaulon lividum*), alpine sweetvetch (*Hedysarum alpinum*), cold mountain crazyweed (*Oxytropis campestris*), silverberry (*Elaeagnus commutata*), alpine arnica (*Arnica alpina*), blue joint grass (*Calamagrostis canadensis*), large-flowered wintergreen (*Pyrola grandiflora*), boreal yarrow (*Achillea borealis*), Siberian aster (*Aster sibiricus*), fireweed (*Epilobium angustifolium*), squashberry (*Viburnum edule*), downy ryegrass (*Elymus innovatus*), fly-away grass (*Agrostis scabra*), sandwort (*Moehringia lateriflora*), rough fescue (*Festuca altaica*), glaucous bluegrass (*Poa glauca*), dense reed grass (*Calamagrostis purpurescens*), and labrador lousewort (*Pedicularis labradorica*) are present on the installation. Figure 3.2-1 shows the vegetation types on Clear AFS.

Diversity of plant communities at Clear AFS is predominantly affected by the type of soil and the frequency and type of soil disturbance. An important soil variable that influences the formation of plant communities on Clear AFS is the amount of fine soil (silt loam or sandy loam) over the underlying gravel. Where the fine soil cap is nearly absent, a gravel barrens community of dry meadows and dwarf woodland occurs. In places with a thin layer of loamy sand or sandy loam, a forest of aspen and mixtures of black spruce occurs. Areas along the eastern and northeastern boundary of Clear AFS have a thicker soil cap and support productive forests of aspen-birch or permafrost-affected black spruce stands (USAF, 1996).

Vegetation on Clear AFS is dominated by a young (about 55 year-old) aspen-black spruce forest with a high fire frequency. Aspen forest on permafrost-free soils occurs for several decades after fire. Black spruce gradually expands under the aspen, especially on finer textured soils, promoting permafrost or persistent seasonal frost. The cooler or permafrost soil environment, covered by forest litter with very slow decomposition and low nutrient availability, gradually kills aspen (USAF, 1996).

Gravel barren communities, unusual in central Alaska, occur on clean, water-sorted, and coarse gravel with no soil cap. Gravel barrens are present over much of the western portion of the installation and consist primarily of lichens, mosses, and other cryptogamic plants. Near Lake Sansing, gravel barrens are located adjacent to the road.

### 3.2.2 Wildlife

Wildlife species present on the installation include black bear (*Ursus americanus*), brown bear (*Ursus arctos*), caribou (*Rangifer tarandus*), moose (*Alces alces*), mink (*Mestula vison*), muskrat (*Ondatra zibethicus*), short-tail weasels (*Mustela erminea*), red squirrels (*Tamiasciurus hudsonicus*), spruce grouse (*Dendragapus canadensis*), sharp-tailed grouse (*Tympanuchus phasianellus*), and least weasels (*Mustela nivalis*). In addition to the large mammals and fur-bearers, numerous other mammalian species of taiga ecosystems would be expected to utilize Clear AFS property (USAF, 2002). These species include shrews, ground squirrels, lemmings, and voles.

A biodiversity survey performed in 1995 at Clear AFS included migratory birds and other bird species. The installation lies in the Nenana River valley, an important migratory route and roosting site for several bird species such as the sandhill crane (*Grus canadensis*).

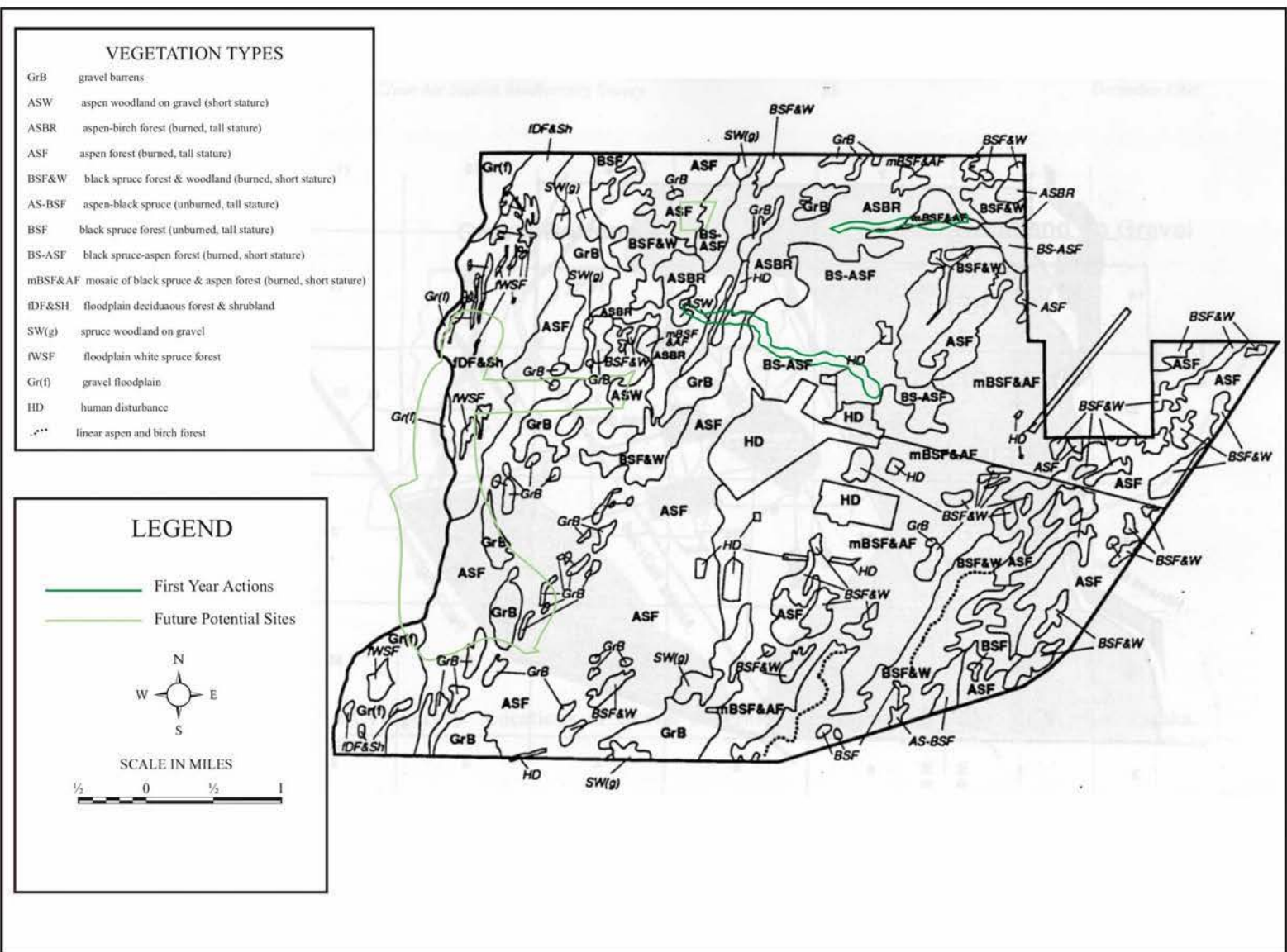


Figure 3.2-1. Plant Community Map of Clear AFS

Large numbers of Canada geese (*Branta canadensis*) have been observed resting and feeding on Clear AFS's radar clearance zone during the fall and spring migration periods (USAF, 2002). Ruffed grouse (*Bonasa umbellus*) are often found in the summer and fall in alder thickets and willow bottoms, as well as in spruce-birch forests and aspen groves. In the winter the ruffed grouse prefers aspen forests as it feeds on the buds and twigs of aspen. Bird species such as the common raven (*Corvus corax*), gray jay (*Perisoreus canadensis*), boreal chickadee (*Parus hudsonicus*), common redpoll (*Carduelis flammea*), hoary redpoll (*Carduelis hornemanni*), and several raptors have been observed at Clear AFS. The Biodiversity Survey contains a complete listing of bird species observed (USAF, 1996).

The installation consistently has difficulty managing migrating swallows that nest on buildings. The birds are an asset to the installation since they feed on mosquitoes; however, they are a nuisance when nesting on occupied buildings.

### 3.2.3 Threatened or Endangered Species, Species of Special Concern

A listed species, provided protection under the *Endangered Species Act*, is so designated because of danger of its extinction as a consequence of economic growth or development without adequate concern and conservation. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or a significant part of its range, other than a species of Insecta determined by the Department, or the Secretary, of the United States Department of the Interior to constitute a pest whose protection under this part would present an overwhelming and overriding risk to humans. A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

No federally listed threatened or endangered species have been identified at Clear AFS. The possibility does exist for transient threatened or endangered animal species to visit the area. The range of the American peregrine falcon (*Falco peregrinus anatum*) (removed from the Endangered Species List in 1999) could potentially be observed on Clear AFS during migration, particularly along the Nenana River.

The state of Alaska defines a Species of Special Concern as any species or subspecies of fish and wildlife native to the State of Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. The Alaska Department of Fish and Game lists the northern goshawk (*Accipiter gentilis laingi*), gray-cheeked thrush (*Catharus minimus*), and the blackpoll warbler (*Dendroica striata*) as species of concern. A biodiversity survey of bird species conducted in 1996 observed the presence of the gray-cheeked thrush and blackpoll warbler at the installation. The northern goshawk was not observed at Clear AFS during this survey; however, there is a potential for this species to occur given suitable habitat and low disturbance (USAF, 2002).

There are four plant species of concern located at Clear AFS, Williams' milkvetch (*Astragalus williamsii*), Setchell's willow (*Salix setchelliana*), sandbar willow (*Salix interior*), and Williams' campion (*Silene menziesii*). Three of the four species (Williams' milkvetch, Setchell's willow, and sandbar willow) were only found near the river on sand

and gravel bars indicating their tolerance to frequent flooding disturbance. Williams' campion was found in five different locations that differed considerably in soil conditions and habitat characteristics. Habitats where Williams' campion was found included sand and gravel bars along the Nenana River, gravel barrens near Lake Sansing and Clear Sky Lodge, a graded gravel area near buildings, and a densely forested area near the center of the installation (USAF, 1996).

#### **3.2.4 Wetlands**

Wetlands are defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Interagency Committee for Wetland Delineation, 1989). Wetlands are diverse ecosystems that provide natural flood control by storing spring runoff and heavy summer rains, replenish groundwater supplies, remove water pollutants, and filter and use nutrients. They also provide habitat for many plant and animal species, including economically valuable waterfowl and 45 percent of the nation's endangered species.

Wetlands are regulated under Section 404 of the CWA and EO 11990 (*Protection of Wetlands*). The USFWS Region 9 oversees Wetland Management Districts in Alaska to provide wetland areas needed by waterfowl in the spring and summer for nesting and feeding. If avoidance to wetlands is not feasible, in order for the project to proceed, the chairman of the MAJCOM Environmental Protection Committee/Environmental, Safety, and Occupational Health Committee must approve a Finding of No Practicable Alternative in accordance with EO 11990. A Finding of No Practicable Alternative must be prepared and public notice of intent must be made before proceeding with U.S. Army Corps of Engineers (USACE) consultation.

A National Wetlands Inventory was completed for Clear AFS by the USFWS in 1992 and 1999. The inventory was prepared using high altitude aerial photographs based on observed vegetation, visible hydrology, and geography in accordance with Classification of Wetlands and Deepwater Habitats of the United States (USFWS, 1979). These aerial photographs typically reflect conditions during the specific year and season when they were taken, but a ground and historical analysis of a single site may result in a revision of these wetland boundaries. Wetlands cover approximately 1,091 acres, or 9.5 percent, of the installation (see Figure 3.1-1) (USAF, 2002). Figure 3.1-1 shows the wetlands in relation to the proposed prescribed burn/shearblading areas. The Proposed Action includes conducting a wetland inventory that would include extensive ground truthing for accuracy. Clear AFS is located on a broad glaciofluvial outwash plain that is comprised of sandy gravel (USAF, 2002). This material is irregularly stratified with both well and poorly graded coarse sand. Because of the draining ability of this material, there are relatively few naturally occurring lakes or ponds in the region. Clear AFS contains no natural streams, ponds or lakes, and is only occasionally marshy in small surface area deposits of sandy silt. Approximately 700 acres of riverine wetlands are found along the Nenana River. Man-made wetlands include Lake Sansing (regulated by the USACE) and the cooling pond near the center of the installation about 20 acres. The remaining wetlands, approximately 350 acres, found on Clear AFS are classified as palustrine (non-flowing



water) and include scrub-shrub; forest, scrub-shrub mix; and scrub-shrub, emergent mix wetlands (USAF, 1996).

Wetlands identified by aerial photography in the project area are mostly Palustrine scrub-shrub (needle-leaved evergreen) with a few Palustrine forested open water (needle-leaved evergreen). Palustrine forested wetlands in Interior Alaska (dominated by black spruce) are often caused by permafrost (permanently frozen ground that creates a barrier to the downward movement of water). Isolated pockets of aspen can persist in the vicinity of a black spruce wetland; however, aspen rarely survives to canopy dominance on a black spruce wetland over permafrost because the soil is too cold and saturated.

### **3.3 PEST MANAGEMENT**

Pests at Clear AFS are managed in accordance with all applicable Federal, state, DoD, and Air Force regulations, standards, and laws that apply to the installation. The majority of pest management activities currently take place in areas which are improved and semi-improved, thus involve only a small portion of the installation. Clear AFS meets the criteria for using the Air Force Space Command Small Installation Integrated Pest Management Plan. The installation uses on the average less than 400 lbs. of pesticide per year (USAF, 2001d). The main use for pesticides are for the control of mosquitoes and silverfish. The pesticides are not allowed for use in areas near surface water. All of the pesticides are applied by state certified personnel in Civil Engineering and are from the “Standard DoD Pesticide List”. In order to minimize the need for pesticides the installation uses only locally grown plant stock, unless alternate sources are pre-approved by the Environmental Coordinator. Clear AFS uses snap traps to control pest like rodents, thus cutting down on pesticides. The installation uses herbicides to prevent the growth of noxious weeds. Noxious weeds are defined as those which are difficult to control, easily spread, and are injurious to public health, crops, livestock, land, and other property.

### **3.4 OUTDOOR RECREATION PROGRAM**

Outdoor recreation opportunities currently center around Lake Sansing which offers excellent near-by year around fishing. A picnic area is currently available with permanent barbecue pits and a few picnic tables. A canoe and two fishing boats are available to recreationists wishing to use portions of the lake otherwise inaccessible. A dock was built during the summer of 1993 to accommodate fishing activities from shore. An enclosed picnic pavilion is available providing shelter to picnickers (USAF, 2002).

Nearby access to secondary roads provides several opportunities e.g. jogging, bicycling, walking, and hiking. Winter activities available are snow shoeing, skating, cross-country skiing, and snowmobile trails. Clear AFS also offers bird watching, nature observation, hunting, and baiting and trapping of small and big game.

Indoor activities available are a gymnasium, bowling alley, and fitness center.

### **3.5 CULTURAL RESOURCES**

Cultural resources are archaeological, historical, and Native American items, places, or events considered important to a culture, community, tradition, religion, or science. Archaeological and historic resources are locations where human activity measurably

altered the earth or left deposits of physical or biological remains. Prehistoric examples include arrowheads, rock scatterings, and village remains, whereas historic resources generally include campsites, roads, fences, homesteads, trails, and battlegrounds. Architectural examples of historic resources include bridges, buildings, canals, and other structures of historic or aesthetic value. Native American resources can include tribal burial grounds, habitations, religious ceremonial areas or instruments, or anything considered essential for the persistence of their traditional culture.

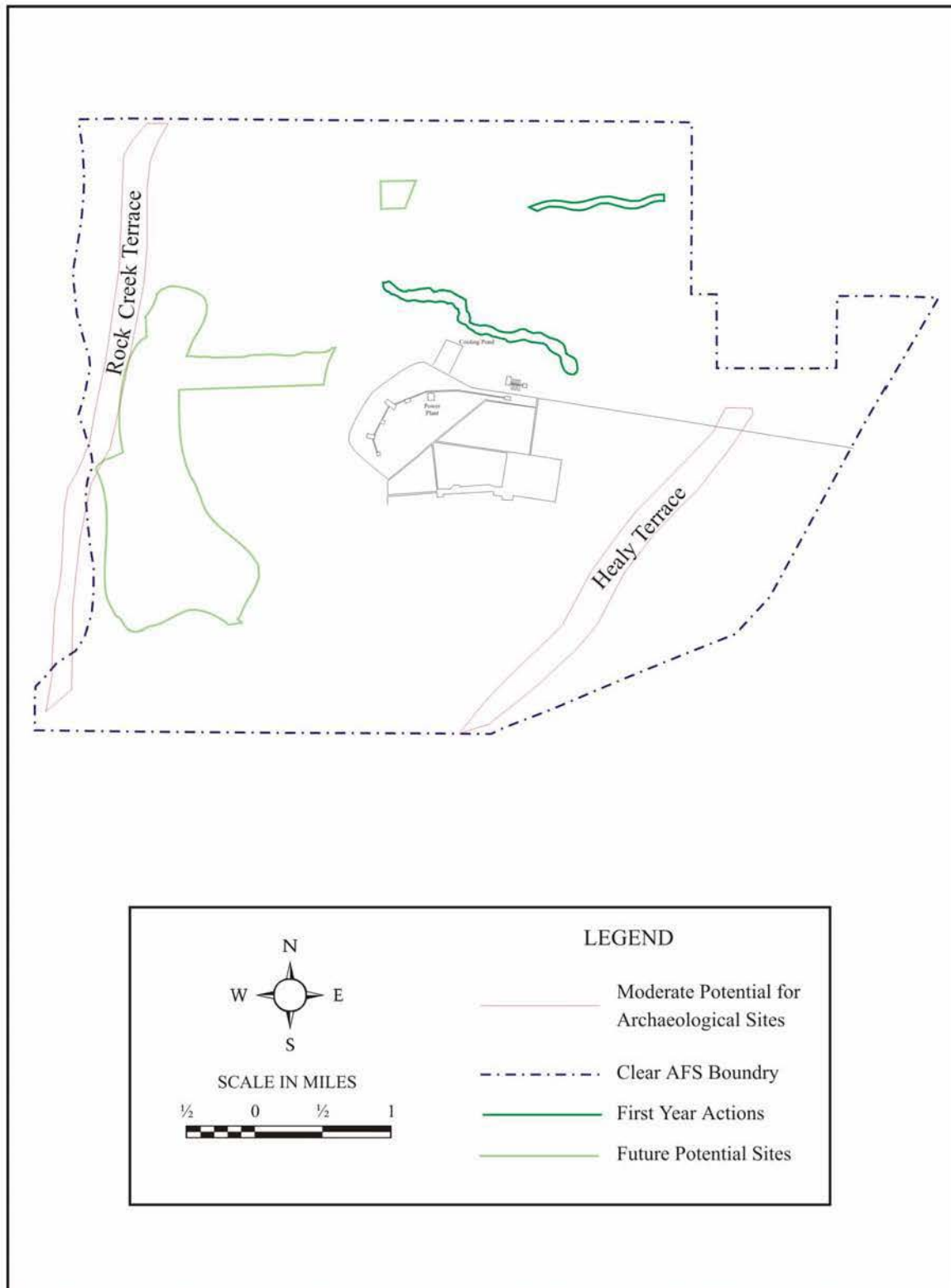
In the region around Clear AFS, Native Alaskans (the Athabaskan “Nenana Band”) used the Nenana River Valley as a transportation route from the summer salmon fishing areas to the autumn caribou and Dall sheep hunting grounds in the foothills north of the Alaska Range. A 1994 study at Clear AFS where sample surveys were performed found the area to have moderate (possibility exists that subsurface sites may be located in the future) or low potential (featureless topography and known areas of landscaping) for Native Alaskan resources.

Clear AFS played a key role in the defense of the United States during the Cold War. Clear AFS is one of only three Ballistic Missile Early Warning System sites of its kind; others were constructed in Thule, Greenland, and Fylingdales, England. Construction of the microwave radar facilities at Clear AFS began in 1958 and the station became operational in 1961. An inventory and evaluation of Cold War-era properties was conducted in 1995 that identified eight structures (101, 102, 104, 105, 106, 735, 736, and 737) as potentially eligible for listing in the National Register of Historic Places (NRHP).

Two archaeological surveys were completed for Clear AFS, the first in 1991 and the second in 1994. The 1991 survey investigated undeveloped portions of the station through sampling and intensive subsurface testing of areas that had high potential (likely to reveal traces of archaeological resources) for archaeological site discovery. The 1994 survey was an expansion of the 1991 survey to sample additional undisturbed lands through visual survey, soil probes, and systematic and judgmental shovel testing. No prehistoric archaeological sites were identified; two historic archaeological sites, a railroad camp and a portion of the original railroad bed, were identified as potentially eligible for inclusion in the NRHP. Based on the sites found and known resources outside the installation, a predictive model was developed to identify the likelihood of finding additional cultural resources. The model rated the predicted occurrence of cultural resources as having high, moderate, or low potential. There are no areas of high potential on Clear AFS (USAF, 1995). Areas having moderate potential for cultural resources include the Healy and Riley Creek terrace margins (see Figure 3.5-1). The remainder of Clear AFS was considered to have low potential for discovery of archaeological resources based primarily on its featureless topography and known areas of landscaping (disturbed ground).

### **3.6 AESTHETICS**

Visual resources consist of the natural and man-made landscape features that appear indigenous to the area, and give a particular environment its aesthetic qualities. Impacts to visual sensitivity are assessed in terms of whether the visual resources are of high, medium, or low sensitivity.



**Figure 3.5-1. Potential for Cultural Resources on Clear AFS**

High sensitivity uses include designated areas of aesthetic, recreational, cultural, or scientific significance such as wilderness areas, state and national parks, wildlife refuges, wild and scenic rivers, and historic areas. Medium sensitivity areas are more heavily developed and contemporary human influence is more apparent. Medium sensitivity uses are generally areas designated by local authorities for recreational, scenic, and historical uses such as community parks, highway scenic overlooks, and hiking trails. All other areas are considered to be of low sensitivity.

The visual resources at Clear AFS consist of two types of landscapes. The developed part of the base (including the Tech Area and Composite Area) has been largely altered by man through the construction of facilities and roads. This area would be minimally affected by the proposed activities of the INRMP. The majority of Clear AFS consists of an area where man has had limited influence on the visual landscape, primarily through construction of unpaved roads and firebreaks. Overall, the sensitivity of visual resources at Clear is medium.

Another method of categorizing visual resources is by attributing visibility to air quality. PSD regulations identify Class I and II areas (see Section 3.1.2). Views of Clear AFS from surrounding areas are limited because of the nearly flat, heavily forested terrain. Views from the installation primarily consist of relatively flat, undisturbed forest, woodland, and meadows.

### **3.7 ENVIRONMENTAL JUSTICE**

The 2000 Census found that the population of Denali Borough was 1,893 with more than 85.7 percent Caucasian, 4.8 percent Native American and Alaska native, 2.5 percent Hispanic or Latino, 1.4 percent Black or African American, 1.5 percent Asian, and others reporting two or more races making up 4.1 percent of the total. In comparison, Alaska's population is 69.3 percent Caucasian, 15.6 percent Native American and Alaska native, 4.1 percent Hispanic or Latino, 3.5 percent Black or African American, 4 percent Asian, and others reporting two or more races making up 3.5 percent of the total.

Nearly 8 percent of Denali Borough's population is below the poverty level, while just over 9 percent of the state's population and 12 percent of the U.S. population fall into this category.

The nearest town to Clear AFS is Anderson which is approximately six miles west off the George Parks Highway. Alaska Natives represent 3.7 percent of Anderson's population. Most of Anderson's residents are non-Native military personnel or civilian employees of Clear AFS and their families. Nearly one-third of all residents live in Clear AFS group quarters.

### **3.8 PETROLUEM, OILS, AND LUBRICANTS (POL)**

Fuels at Clear AFS are managed in accordance with all applicable Federal, state, local, Department of Defense, and Air Force regulations, standards, and laws that apply to the installation. Clear AFS has prepared a Spill Prevention and Response Plan (SPRP) in accordance with all applicable criteria in 40 CFR Part 112.7 (USAF, 1999a). The purpose of the SPRP is to provide guidance to installation personnel regarding spill prevention and

response. The installation has a spill response team that responds to all reported spills on the installation. Spill response includes the use of on-site spill containment equipment and materials. In accordance with the SPRP, the Fire Department and the Environmental and Health Services Coordinator would be notified in the event of anything other than minor spills. The Clear AFS Fire Department would provide emergency response and fire protection in accordance with the SPRP.

Storage tanks at Clear AFS primarily store fuel oil for building heating and diesel fuel and gasoline for motor vehicles. There are no tanks located within the proposed areas for fire management (prescribed burns/shearblading). Diesel fuel and gasoline could be used from the tanks on Clear AFS if the installation conducts the prescribed burns. If the action is contracted out, the contractor would most likely bring his own fuel.

# **CHAPTER 4**

## **ENVIRONMENTAL CONSEQUENCES**



## **4. ENVIRONMENTAL CONSEQUENCES**

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This chapter discusses the potential for significant impacts to the human environment as a result of implementing Alternative A (No Action), Alternative B (Current Situation), or Alternative C (the Proposed Action). As defined in 40 CFR 1508.14, the human environment is interpreted to include natural and physical resources, and the relationship of people with those resources. Accordingly, this analysis has focused on identifying types of impacts and estimating their potential significance. This chapter discusses the effects that the Proposed or Alternative Actions or the No Action Alternative could generate in the environmental resource areas described in Chapter 3.

The concept of “significance” used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR 1508.27. Severity of an impact could be based on the magnitude of change, the likelihood of change, the potential for violation of laws or regulations, the context of the impact (both spatial and temporal), and the resilience of the resource. Significant impacts are effects that are most substantial and should receive the greatest attention in decision making. Impacts that are not significant include those that result in little or no effect to the existing environment and cannot be easily detected. If a resource would not be affected by a proposed activity, a finding of no impact was declared. If a resource would be measurably improved by a proposed activity, a beneficial impact was noted.

This chapter is organized by resource element in the same order as introduced in Chapter 3. For each resource section, the analysis methods are described. These are followed by a discussion of the potential impacts of Alternative A (No Action), Alternative B (Current Situation), or Alternative C (the Proposed Action). Lastly, mitigation measures are presented. The chapter concludes with a discussion of the compatibility of the Proposed and Alternative Actions with objectives of Federal, state, and local land use plans, policies, and controls, an evaluation of the relationships between short-term uses of the environment and long-term productivity, cumulative impacts, and irreversible and irretrievable commitments of resources.

### **4.1 PHYSICAL RESOURCES**

Alternative A would not result in short-term impacts to air quality, geological resources, soil, or water resources, but could result in significant long-term impacts to these resources due to a continued high risk of wildfires. Depending on the intensity of a wildfire, significant amounts of pollutants could be generated, as well as substantially increased soil erosion and sedimentation of surface water and wetlands. Short-term impacts to air quality or geological resources, soil, and water resources would not be significant from Alternative B. The long-term risk of wildfire would be slightly reduced through the maintenance of firebreaks. Proposed activities under Alternative C would generate increased criteria air pollutants, increase soil erosion and sedimentation, and result in minor changes to groundwater. The impacts would not be significant. As the proposed forest management activities progress, the risk of wildfire would be diminished. Other smaller projects would have minimal impacts on physical factors.



#### **4.1.1 Potential Impacts on Air Quality**

Alternative A would not result in additional air quality impacts. However, the limited fire suppression would maintain a high risk of accidental fire which could result in significant air quality impacts. Alternative B would result in minimal increases in impacts to air quality, primarily from maintenance of firebreaks and drainage ditches. Alternative C would result in increased emissions of pollutants, mainly from utilizing prescribed fire or shearblading to reduce the impact of disease and insects, and reduce the potential for wildfires. Other activities would result in minimal increases in pollutant emissions. Impacts to air quality from Alternative C would not be significant. There would be no long-term impacts. A burn permit would be required from the Alaska Department of Natural Resources for prescribed burning. Other smaller projects would have minimal impacts to air quality.

##### **4.1.1.1 Analysis Methods**

The analysis was based on a review of existing air quality in the region, information on Clear AFS air emission sources, projections of emissions from the proposed prescribed fire and shearblading, a review of Federal and state regulations, and requirements per the AAC, and the use of air emission factors from the USEPA.

##### **4.1.1.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternative A**

Alternative A would not result in significant short-term air quality impacts. Vegetation on Clear AFS is dominated by an aspen-black spruce forest with a high fire frequency. Decomposition is very slow, leading to a buildup of combustible materials. Alternative A would incorporate limited fire suppression, only as needed to protect property and human lives. Opportunities for wildfire to occur either from a lightning strike or ignition by humans would remain a high risk if fuel loads are not reduced through prescribed fire, shearblading, or firewood salvaging. Significant amounts of smoke and criteria pollutants could be generated, depending on the size and intensity of a wildfire. Long-term impacts from the Alternative A have the potential to be significant to air quality resources on Clear AFS.

Activities under other natural resource management plans (wetlands, fish and wildlife, pest management, outdoor recreation, and cultural resources) under Alternative A would be temporary and would not have a significant impact on air quality.

##### **Potential Impacts from Alternative B**

Limited amounts of criteria pollutants would be generated from maintenance of firebreaks and ground maintenance. Impacts to air quality would not be significant. While the maintenance of firebreaks would somewhat reduce the hazard of wildfires on Clear AFS, significant impacts to air quality could occur from a wildfire.

Emissions would also be generated from cleanup of drainage ditches. Due to the limited nature of these activities, impacts to air quality would not be significant.

Activities under other natural resource management plans (wetlands, fish and wildlife, pest management, outdoor recreation, and cultural resources) under Alternative B would be temporary and not have a significant impact on air quality.

### **Potential Impacts from Alternative C**

Most of the emissions from implementing Alternative C would be generated from prescribed fire or shearblading. About 100 acres per year would potentially be managed with these activities, over a period of up to 10 years. A Fire Management Plan would be developed to identify areas to be treated, the best method of treatment, and specific procedures to be followed for treatment. A burn permit would be required from the Alaska Department of Natural Resources.

Existing firebreaks would be maintained for use during prescribed burning, generating small amounts of combustion byproducts (CO, NO<sub>x</sub>, VOCs, and particulates) from trucks and equipment (brush cutters and chainsaws). Prescribed burns would generate large quantities of smoke that could be produced in the area during a short period of time. Smoke consists of small particles (particulate) of ash, partly consumed fuel, and liquid droplets. Other prescribed burn combustion products include CO, carbon dioxide (CO<sub>2</sub>), VOCs, and small quantities of NO<sub>x</sub>. Particulates reduce visibility; the amount of particulate put into the air depends on the amount and type of fuel consumed and the fuel moisture content. The rate of smoke dispersal depends mainly on wind speed and atmospheric stability. Typically prescribed burns would only be ignited in good dispersal conditions (transport winds of greater than seven miles per hour and an atmospheric mixing height of greater than 1,650 feet). This would result in minimal concentration of smoke, reducing the potential air quality impacts.

Estimated emissions from the prescribed fire would not exceed the NAAQS or AAAQS due to the amount of criteria pollutants generated (see Table 4.1-1), the relatively large area in which the emissions would occur, and the dispersive meteorological conditions in which the emissions would be generated. Emissions from prescribed burns are considered an area stationary source. However, these emissions are not considered a major stationary source under PSD standards (40 CFR 52.21) and the emissions would not impact any Class I areas (the closest Class I is Denali National Park, located 16 miles south of Clear AFS).

If shearblading was conducted, there would be increased emissions from the use of heavy equipment and worker vehicles. Emissions from shearblading were estimated using USEPA emission factors. The type of equipment used would include two bulldozers and two pickup trucks (for transporting fuel and miscellaneous equipment and supplies). Bulldozers would generate the most emissions, with CO, NO<sub>x</sub>, and VOCs as the main constituents of exhaust (see Table 4.1-1; detailed calculations are shown in Appendix B). Worker vehicles and pickup trucks driving on unpaved trails or roads would generate fugitive dust (measured as PM<sub>10</sub>). The amounts estimated are conservatively high, as the analysis did not take snow cover or frozen ground into consideration. Shearblading is proposed to occur during winter for approximately two weeks. Only minimal amounts of PM<sub>10</sub> would be generated from the shearblading because only minor soil disturbance would occur and the frozen ground and snow cover would minimize particulate generation from the soil, vegetative cover, and unpaved roads.

<p align="center"><b>Table 4.1-1</b>  <b>Estimated Emissions from the Proposed Action (tons per year <sup>1</sup>)</b></p>					
	<i>VOC</i>	<i>PM<sub>10</sub></i> <sup>2</sup>	<i>CO</i>	<i>SO<sub>x</sub></i>	<i>NO<sub>x</sub></i>
Prescribed fire	5.29	6.67	63.96	0.36	3.36
Shearblading	0.16	0.80	0.94	0.15	1.57
Shearblading with windrows burning	5.21	6.56	63.24	0.18	1.69
<p><sup>1</sup> Tons per year for ten years, assuming 100 acres per year would be treated through prescribed fire or shearblading</p> <p><sup>2</sup> Estimated PM<sub>10</sub> for shearblading is conservatively high, as frozen ground and snow cover are not considered in the analysis. These factors would substantially reduce the emissions of PM<sub>10</sub> from fugitive dust from vehicle trips on unpaved roads.</p> <p>Source: Calculated with emission factors from AP-42 (USEPA, 2001; USEPA, 1991).</p>					

Vegetation felled during shearblading would be gathered into windrows, and either left in place to decompose, or be burned. Burning windrows from shearblading would generate emissions similar to prescribed fire. Windrows would only be ignited in good dispersal conditions (transport winds of greater than seven miles per hour and good atmospheric mixing conditions). For the purpose of analysis, it is assumed that 50 percent of the windrows would be burned in any year.

The emissions generated from burning windrows are shown in Table 4.1-1. As under the prescribed fire, once the shearblading and burning is completed, emissions would cease. Fugitive dust could be generated from limited amounts of wind erosion from exposed soil in the short-term; as vegetation is reestablished, levels of fugitive dust would decline to existing conditions. Impacts to air quality would not be significant.

As discussed in Section 3.1.3, the State of Alaska requires that reasonable precautions be taken to prevent fugitive dust generation caused by handling, storing, or transporting bulk materials. Standard precautions include such measures as watering or covering materials, and the use of chemical stabilizers. Shearblading would disturb about 100 acres per year. Tree debris would be windrowed on site. As noted above, the generation of PM<sub>10</sub> would be minimized by frozen ground and snow cover. Minimizing soil disturbance would further limit PM<sub>10</sub> emissions.

Visibility protection areas, as defined by the State of Alaska, are between 30 and 65 miles south of Clear AFS. Smoke from prescribed fire or burning windrows would be visible from Anderson (one of the sites is about four miles south of Anderson), but would disperse before reaching Anderson. Impacts to air quality would not be significant at Clear AFS or Anderson. Air quality would not be impacted at Healy or Nenana, and visibility protection areas to the south of Clear AFS would not be impacted.

The prescribed fire or shearblading activities would have an unavoidable short-term impact on air quality. Exhaust emissions from bulldozers and personal vehicles would be generated along with minimal amounts of fugitive dust during bulldozing activities. These emissions would not be significant, given the limited types and quantity of equipment to be used and the area to be disturbed. Best management practices to reduce fugitive dust emissions, such as minimizing soil disturbance and replacing ground cover in disturbed

areas as quickly as possible, should be implemented to the maximum extent possible to reduce the amount of these emissions.

Once the prescribed fire or shearblading is completed, emissions from bulldozers and worker vehicles would cease. Fugitive dust could be generated from limited amounts of wind erosion from exposed soil in the short-term; as vegetation is reestablished, levels of fugitive dust would decline to existing conditions and impacts would not be significant. As areas are treated by prescribed fire or shearblading, the risk of wildfires would diminish.

Other activities to implement the INRMP (completion of a soil survey, constructing alternative nesting sites for swallows, conducting a threatened and endangered species survey, constructing a wildlife viewing area and nature trail, and constructing cabins) would generate minimal emissions of criteria air pollutants from vehicles, construction equipment, and fugitive dust from land clearing activities. Impacts to air quality would not be significant from these activities alone or cumulatively with forest management activities.

Activities associated with Alternative C would not involve any new stationary sources and would not require a construction permit or an ambient air quality investigation. Projected emissions would still need to comply with NAAQS and AAAQS. Clear AFS, within the Northern Alaska Intrastate AQCR, is located nearly 60 miles from the Fairbanks nonattainment area for CO. No impacts would occur to the nonattainment area (if a major source is located within ten kilometers (six miles) of a nonattainment area, it must meet the requirements of 18 AAC 50.300e and demonstrate conformity with the SIP). Because of the small quantity of potential emissions and the generally dispersive meteorological conditions (an average of 5 to 13 mile per hour winds for most of the year), the emissions would not exceed or contribute to an exceedance of air quality standards; the impacts would not be significant.

Alternative C would not occur in a nonattainment or maintenance area and would not impact the CO nonattainment area at Fairbanks; therefore, further conformity analysis is not required.

#### **4.1.1.3 Mitigation Measures**

Mitigation measures can be used to reduce air emissions, but because the potential emissions are not significant, no mitigation is necessary or suggested.

#### **4.1.2 Potential Impacts on Geological Resources**

Alternative A would not result in short-term impacts to geological resources. However, the limited fire suppression would maintain a high risk of accidental fire which could result in significant long-term soil impacts. Alternative B would result in minimal increases in soil erosion, primarily from maintenance of firebreaks and drainage ditches. The risk of wildfire would be somewhat reduced, but significant impacts could result from a wildfire. Alternative C would result in increased soil erosion, mainly from utilizing prescribed fire or shearblading to reduce the impact of disease and insects, and reduce the potential for wildfires. Impacts to geological resources would result primarily from effects on soils from prescribed fire or disturbance of the ground from shearblading. Prescribed fire would

impact physical and chemical properties of the soil. Other activities such as construction of the cabin and nature trail would result in minor soil erosion. Impacts to geological resources and soils from Alternative C would not be significant. There would be a long-term reduction in the hazard of wildfire.

#### **4.1.2.1 Analysis Methods**

Site investigations, USGS documents, previous EAs, the Biodiversity Survey, and a USGS topographical map were reviewed to characterize the existing environment. Proposed activities under Alternatives A, B, and C that could influence geological resources were evaluated to predict the type and magnitude of potential impacts. For example, soil would be disturbed during prescribed fire or shearblading activities. The predicted changes from implementing the Alternatives were compared to the existing environment and evaluated to determine if significant changes in any existing conditions would occur.

#### **4.1.2.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternative A**

The proposed prescribed fire or shearblading would not occur under the No Action Alternative. Black spruce would continue to invade and crowd out areas of aspen and birch trees. The soil would continue to cool from the heavier shade of the black spruce, leading to more favorable conditions for black spruce and less favorable conditions to the aspen and birch. Additional areas of permafrost would tend to develop over time, eventually leading to the growth of wetlands where black spruce would dominate the forest. The risk of wildfires would be higher with the spread of the black spruce. Long-term impacts have the potential of being significant to soils from the higher risk of wildfire which would reduce vegetative cover, burn the overlying organic matter of the soil, and increase the potential for erosion and melting of permafrost.

Activities under other natural resource management plans under Alternative A would not impact geological resources. The proposed soil survey would not be conducted and management of areas would continue with limited knowledge of soil conditions.

##### **Potential Impacts from Alternative B**

Limited amounts of erosion could occur from maintenance of firebreaks and ground maintenance. The maintenance of firebreaks would somewhat reduce the hazard of wildfires on Clear AFS, but significant impacts to soils could occur from these fires.

Due to the limited nature of other proposed INRMP activities under this alternative (primarily clearing secondary roads for firebreaks), impacts to geology and soils would not be significant. The proposed soil survey would not be conducted and management of areas would continue with limited knowledge of soil conditions.

##### **Potential Impacts from Alternative C**

Prescribed burning and shearblading would be conducted in a manner to minimize disturbance to soils and the overlying organic layers. Approximately 100 acres would be treated per year for 10 years. The underlying geological layers would not be disturbed by either action. As discussed in Section 3.1.3, a thin layer of silty soils is underlain by

unconsolidated alluvium to a depth of several hundred feet. Existing firebreaks would be used to support the prescribed fire. Minor erosion or compaction could occur as firebreaks are cleared, but only a limited area would be impacted and the potential for erosion on Clear AFS is low. Low-lying areas should be avoided to the extent possible, as these areas are more susceptible to erosion and siltation as the vegetation and organic matter are removed and the permafrost melts (UW, 1973). Impacts from maintenance of firebreaks would not be significant.

The prescribed fires are anticipated to remove some of the vegetation and organic layers on top of the soils. This would increase potential runoff and the potential for soil erosion. The amount of vegetation and debris left after the fires is dependent on the intensity and duration of the fire. A low to medium intensity prescribed fire would generally not burn much of the organic layer of the soil. Most of the proposed area for prescribed fire has been previously burned by wildfire and is in various successional stages of vegetation (birch, aspen, and black spruce). The hazard of wind erosion is slight to moderate, depending on the extent of silt and sand at the site. Some erosion could occur in exposed soil. Potential soil erosion by water or wind would be limited due to regeneration of vegetation, limited rainfall, the slight slope of the area, the amount of time that the soil is frozen, and the high water holding capacity of the soil. Soil would warm from the fires and somewhat reduce areas of permafrost, making nutrients more available (UW, 1973). Thermokarst may form in areas with higher amounts of permafrost, where subsidence of some areas from the release of meltwater results in a polygon pattern of ditches and mounds. A layer of charcoal in the soil, which would form after the fire, would absorb phytotoxic phenolic chemicals in the soil which inhibit the rooting and growth of aspens (AFES, 2000). A short-term increase in availability of nitrogen, calcium, potassium, and phosphorous would be available for initial regrowth of vegetation (UW, 1973). Other impacts to the soil include reduced porosity of the soil from fine ash particles clogging the pore spaces of the soil and, depending on the intensity of the fire, a physical or chemical crust near the upper surface of the soil (PFMT, 2001). With low- to medium-intensity fires, the short-term impacts to soils would not be significant.

Prescribed fire would provide a long-term beneficial impact to the soil by reducing the potential for a major wildfire. A major wildfire would result in significant impacts to the soil through a loss of organic matter and physical and chemical changes to the soil leading to increased erosion. Temporary increases in soil nutrients from prescribed fires would favor the regeneration of birch and aspen (UW, 1973).

If shearblading is selected as an alternative to prescribed fire, minor compaction of the ground surface would occur when construction equipment travels through forested areas and performs shearblading, gathering of cut trees, and piling the trees into windrows. These activities would occur during winter months when the ground would be frozen, thus limiting compaction impacts throughout the area designated for shearblading. Retrieval of trees for firewood via pick-up truck and other private vehicles would also disturb the ground surface; this activity would happen starting in late spring and cause compaction, but only in limited areas. The underlying alluvium is not anticipated to be affected by the surface activities. This alluvium is a source of groundwater, which is used at the installation for domestic and industrial uses. Section 4.1.3.2 discusses potential impacts to groundwater. Impacts to geological resources would not be significant.

Impacts to topography would not be significant. During the shearblading and the process of moving felled trees into windrows, some minor, incidental changes to the topography could occur and could slightly modify existing topography. However, the Proposed Action would not significantly affect the topography or drainage in the area.

Shearblading would reduce the vegetative cover over the soil. During the process of moving felled trees into windrows, some soil and the organic layer above it could be slightly disturbed. The potential for erosion by water is slight due to nearly level land (slopes are about 0.5 percent). The hazard of wind erosion is slight to moderate, depending on the extent of silt and sand at the site. Some erosion could occur in exposed soil. Short-term impacts would occur until the vegetation is reestablished, but these impacts would not be significant. Potential siltation of wetlands from erosion is addressed in Section 4.2.5.

Burning windrows would heat the soil; the intensity of heating would depend upon the time of the burn. In June, the ground is still frozen to within an inch or two of the surface. Conducting burning at this time would limit the thermal impacts of the fire down into the soil. By August, the soil is thawed out to a deeper extent, and it is much warmer and dryer. The thermal effects to the soil would be greater at this time, affecting the aspen root structure. More die-off of the root structure would occur with an August burn. With more favorable conditions from burning the windrows in June, more sprouting of aspens would occur, reducing the potential for soil erosion to occur. Consequently, if this alternative were implemented, the Air Force would conduct burning in June (Paragi, 2001).

Ash produced by burning would be a beneficial fertilizer for resprouting of the aspen trees. The fire would consume some of the organic layer, but the ash would compensate for the loss and serve as a nutrient supplement. Windrows would not be burned near streams or rivers to limit the impact of erosion and siltation of ash (Paragi, 2001). The closest natural surface water body (other than wetlands) is about 1,000 feet away from the proposed activities. Impacts to geology and soils would not be significant.

Construction of a nature trail, a wildlife viewing area, and recreational cabins would result in increased soil erosion, but would not impact underlying geological layers. Due to regeneration of vegetation, limited rainfall, the slight slope of the area, the amount of time that the soil is frozen, and the high water holding capacity of the soil, erosion would be minor. As discussed in Section 3.1.2, Clear AFS is located in Seismic Zone 3. The cabins would need to be constructed in accordance with Air Force Manual 88-3 (Seismic Design for Buildings), using seismic design standards for Standard Occupancy Structures (Category IV). Other proposed activities under Alternative C would not impact geological resources and only slightly impact soils. Completion of a soil survey would involve taking soil borings and mapping the entire installation. Trucks, cars, and all-terrain vehicles would be used for ground transportation. Some minor compaction and erosion could occur, but impacts would not be significant. The fieldwork for this survey is anticipated to begin in 2003 and be completed in 2006. A completed soil survey will provide more accurate and detail characterization of soil properties and highlight potential hazards and impacts of land use on soils, improving the management of soil resources at Clear AFS.

#### **4.1.2.3 Mitigation Measures**

No significant impacts would result from implementing Alternatives A, B, or C. Thus, no mitigations would be required.

#### **4.1.3 Potential Impacts on Water Resources**

Alternative A would not result in significant impacts to water resources. However, the limited fire suppression would maintain a high risk of accidental fire which could result in significant impacts from soil erosion and siltation of waters. Alternative B would result in minimal increases in soil erosion and siltation, primarily from maintenance of firebreaks and drainage ditches. Impacts would not be significant. Alternative C would result in direct impacts to water resources from the effects of prescribed fire on soil, or from disturbing the ground during shearblading activities. Other proposed activities would minimally impact water resources. Short-term disturbances from forest management and other activities from Alternative C could cause wind or water soil erosion. No significant impacts are projected to occur to surface water from airborne sediment or surface water runoff. No impact to the unconfined aquifer and groundwater would occur because of its extensive area and depth. There would be no impacts to floodplains.

##### **4.1.3.1 Analysis Methods**

To establish the potential impact of Alternatives A, B, and C, documents on the hydrology, and hydrogeology of the area were reviewed. The planned activities were compared to existing activities to evaluate the potential changes. Maps showing topography, watersheds, and installation drainage were examined. The review focused on the proximity of the areas planned for prescribed fire, shearblading, and construction activities to surface waters, hydrogeology in the project area, and water quality in the local area, and evaluated the effects of the potential actions with regard to those factors.

##### **4.1.3.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternative A**

The proposed prescribed fire or shearblading would not occur under Alternative A. There would be an increased fire risk each year that prescribed fire or shearblading would not occur. Long-term impacts have the potential of being significant to surface water resources because of a higher risk of wildfire which would reduce vegetative cover, burn the overlying organic matter of the soil, and increase the potential for erosion and siltation. Any impacts to groundwater would not be significant due to the large areal extent of the aquifer recharge area, the depth to the water table, and the well depths of approximately 150 feet. No impacts would occur to floodplains.

Ongoing outdoor recreation and fish and wildlife programs associated with this Alternative would not have a significant impact on water resources.

##### **Potential Impacts from Alternative B**

Limited amounts of erosion and deeper thawing of permafrost in areas cleared of vegetation and organic matter could occur from maintenance of firebreaks and ground maintenance. Due to the low potential for erosion, impacts would not be significant. The



maintenance of firebreaks would somewhat reduce the hazard of wildfires on Clear AFS, but significant impacts to water resources could occur from these fires.

Due to the limited nature of other activities under this Alternative (clearing secondary roads for firebreaks, conducting field work for wetland, soil, and wildlife surveys, and continuing pest management activities in the main base area), impacts to water resources would not be significant.

### **Potential Impacts from Alternative C**

The main effect of prescribed burning on water resources is the potential for increased runoff from rainfall after a burn due to loss of vegetation and organic matter and changes in soil properties (see Section 4.1.2.2). If surface water runoff increases after burning, it could carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and lakes reducing water quality. As discussed in Section 4.1.2.2, the potential for soil erosion is limited by regeneration of vegetation, limited rainfall, the slight slope of the area, the amount of time that the soil is frozen, and the high water holding capacity of the soil. For most areas where prescribed burns would be implemented, the nearest surface water is wetlands (see Section 4.2.5 for a discussion of impacts to wetlands). Impacts to surface water from prescribed fire would not be significant. The land clearing and grading activities under the Proposed Action would not discharge any pollutants to waters of the United States; therefore, a NPDES permit would not be required.

Rainwater would leach minerals (primarily nitrogen and calcium) out of the ash created from the fires and into the soil. In silty soils with an underlying layer of sandy gravel, leaching may also move minerals through the soil layer into the groundwater. Leaching would be limited by the amount of time that the soil is frozen, and the permafrost underlying some areas. The depth to groundwater varies from 20 to 100 feet in effected areas and any increase in available nutrients would not likely reach the groundwater. A short-term increase in water levels could occur as permafrost melts where vegetation and organic matter is cleared, creating small areas of water filled depressions (UW, 1973). Considering that about one percent of Clear AFS would be impacted by prescribed fire each year for 10 years and that permafrost occurs in limited areas, the impact would not be significant. Firebreak clearing and prescribed burning activities would not likely have any long-term impacts on groundwater levels in the area. The small proportion of the recharge area affected would not cause any noticeable change to the water table within the unconfined aquifer.

The shearblading activities proposed under Alternative C would not discharge any pollutants to waters of the United States; therefore, a separate NPDES permit would not be required. Shearblading, if implemented, would be conducted when the soil is frozen to minimize potential compaction and erosion. Siltation from potential wind or water erosion would be minimal. Erosion could occur in areas cleared of vegetation as the soil warms, but erosion would be limited due to the slight slope, the low amount of spring and summer rainfall, the high water holding capacity of the soil, and the amount of time that the soil is frozen. Small temporary water filled depressions could form in some low lying areas cleared of vegetation in areas where permafrost could melt due to soil warming. The installation's Stormwater Pollution Prevention Plan would need to be updated to include

the area disturbed for shearblading. Due to the slight slopes, high permeability (and low runoff) of the soils, and the considerable distance to surface waters, impacts from the Proposed Action would not be significant.

Because the soils in effected areas are gravelly, minor compaction on the surface would minimally affect groundwater recharge in the area of disturbance; the pore spaces between the gravelly soils are larger than soils with high levels of clay and can still maintain the same effective porosity after compaction. Less than one percent of undeveloped area would be affected per year. Removal of vegetation would cause a short-term increase of infiltration to groundwater. Because the alluvial aquifer is unconfined and recharge occurs over hundreds of square miles, aquifer recharge would not be significantly affected by the proposed shearblading program.

The water wells at Clear AFS are 150 feet deep. If a spill of a liquid or soluble hazardous material (such as fuel) would occur during shearblading, it could be transmitted to the groundwater through the gravel and sand alluvium. Measures should be taken to prevent spills of hazardous materials (such as secondary containment around fuel storage tanks) and if any spills occur, they should be cleaned up promptly to prevent potential contamination of the underlying aquifer.

Approximately 1,100 acres of the installation are within the Nenana River floodplain. No activities would occur near the 100-year floodplain of the Nenana River, in the southwestern portion of the installation (Paragi, 2001).

As discussed in Section 4.1.2.2, burning windrows would heat the soil, but because the activity would be planned for June when adequate soil moisture is present, thermal impacts would be limited to the near-surface soil. Due to the shallow gradient and distance to surface waters, minimal erosion and runoff are projected to occur. Ash produced by burning would be transported by winds and deposited in the surrounding area. Windrows would not be burned near streams (within approximately 100 feet) to limit the impact of erosion and siltation of ash (Paragi, 2001). Impacts to surface water would not be significant. Potential leaching of ash into groundwater would be limited by soil conditions and would not be significant.

Precautions would be taken to avoid contaminating water sources during pesticide applications. Spraying would be avoided during windy conditions to prevent drift or when there is a potential for runoff due to rain. The procedures outlined in the base spill plan would be followed in the event of a pesticide spill.

Other activities proposed under the INRMP would minimally effect water resources. Construction of an access road for constructing recreational cabins would result in limited erosion along and near the path of the road. Low lying depressions and wetlands should be avoided to reduce potential impacts from siltation. Clearing of land, grading, and construction of the cabins would also cause limited erosion. If the site selected for the cabins is near wetlands, silt barriers or other measures to control erosion should be implemented to avoid siltation of the wetlands. Groundwater and the floodplain along Nenana River would not be impacted by these proposed activities. Construction of a wildlife viewing area, a nature trail, delineating wetlands, and conducting fieldwork for a soil survey would minimally effect water resources and impacts would not be significant.

#### **4.1.3.3 Mitigation Measures**

No mitigation measures are required, as no significant impacts from implementing the Proposed Action or Alternative Action were identified.

### **4.2 BIOLOGICAL RESOURCES**

Alternative A would implement the minimum military mission requirements and would not significantly affect biological resources. Alternative B would maintain the current, low-intensity management practices applied by Clear AFS, no significant impacts would occur. Implementation of Alternative C would be beneficial to all biological resources on Clear AFS. Native vegetation would benefit from a Fire Management Plan, and the corresponding prescribed burning, as well as an Invasive Species Control Plan. Fisheries on Clear AFS would benefit from the proposed non-application of pesticides near lakes, fish stocking, and removal of pest fish species. An increase in native habitat, due to forest management practices, would benefit wildlife on the installation, while threatened and endangered species would be inventoried and continue to be monitored under appropriate Federal and state regulations. Wetlands would benefit from an increased effort to preserve intact and undisturbed areas.

#### **4.2.1 Analysis Methods**

The assessment of potential impacts to biological resources encompassed all ecosystems within the boundaries of Clear AFS. Vegetation, wildlife, threatened or endangered species, and wetlands were evaluated. The *Clear AFS Integrated Natural Resource Management Plan* (USAF, 2002), the *Biodiversity Survey Report of Clear AFS* (USAF, 1996), and other environmental documents were reviewed to provide data on existing biological resources on the installation.

#### **4.2.2 Potential Impacts on Vegetation**

Impacts on vegetation from Alternatives A, B, and C are discussed below.

##### **Potential Impacts from Alternative A**

Alternative A would have no significant direct impact on vegetation. Under this Alternative, maintenance and fire suppression of improved and semi-improved lands would continue; however, there would be limited forest management, no restoration activities, no prescribed burns, and no shearblading.

This Alternative calls for fire suppression only if a viable threat against improved or semi-improved lands exists. The lack of fire suppression on unimproved grounds would lead to an increase in wild fires that would affect forest composition and alter vegetative diversity. Also, a reduction or absence of forest management, along with the removal of current pesticide usage on improved lands, would lead to an increased potential for the establishment of exotic, invasive plant species in and around the installation.

Due to the expanse of undisturbed, native vegetation surrounding the installation, Alternative A would have no significant impact on the plant communities of Clear AFS. Potential impacts would result if a population were disturbed, but impacts would not be significant if the area could be re-established to its original state and condition, or if the population is sufficiently large or resilient to respond to the action without measurable

change. There would be no significant impacts to vegetation from outdoor recreation activities.

### **Potential Impacts from Alternative B**

Alternative B maintains the current low intensity natural resource management procedures by the installation. Although this Alternative is similar to Alternative A in its implementation of minimal management strategies on unimproved grounds, it does not forfeit the current efforts to maintain a forest stand inventory, apply pesticides for weed control on improved grounds, and allow only locally grown plant species for landscaping. Forest stand inventories are valuable tools when assessing the biodiversity and necessary management strategies of a forest community. Clearing secondary roads and maintaining them for firebreaks would open up areas and create favorable conditions in limited areas for flowering annuals and perennials, slightly increasing species diversity. The application of pesticides on improved grounds and the planting of only native species for landscaping would aid in the avoidance of exotic, nondesirable plant species on the installation and maintain the current aesthetic value of the area. Implementation of Alternative B would not significantly impact vegetation.

### **Potential Impacts from Alternative C**

Alternative C proposes medium to high intensity natural resource management strategies that would provide beneficial impacts to the unimproved areas on the installation. These Alternatives propose prescribed burning, shearblading, and implementing a Fire Management Plan as means of enhancing vegetative heterogeneity. A Burn Plan would be prepared and coordinated through the Alaska Fish and Game.

Fire can injure or kill part of a plant or the entire plant depending on how intensely the fire burns and how long the plant is exposed to high temperatures. Plant characteristics such as bark thickness and stem diameter influence the susceptibility to fire. Small trees of any species are easier for fire to kill than large trees. The proposed periodic low- to moderate-intensity prescribed burns at Clear AFS would maintain the aspen-black spruce forest on the installation.

Fire enhances habitat heterogeneity by creating a variety of successional stages and increasing species diversity. The mix of aspen and spruce in the affected areas are well-adapted to fire and would recover quickly. A low to moderate intensity fire would open the understory temporarily and enhance the growth of pioneer species. Prescribed burning would be beneficial by improving habitat conditions for watch-listed (species that are watched for evidence of decline) vascular plants that thrive in open habitats and are presently restricted to roadways and disturbed sites. Fire releases vital nutrients into the soil promoting increased health in all vegetative species.

Shearblading is an effective method of clearing trees and understory from a specified area. The proposed shearblading would cut trees at ground level with minimal disturbance to the soil and root systems. Because the soil would be minimally disturbed, root systems would primarily remain intact and regeneration would occur. Short-term impacts to vegetation would not be significant since the majority of the root systems would remain intact. Shearblading would enhance habitat heterogeneity in the long-term by creating a variety of successional stages among vascular plants, thus increasing species diversity. Pioneer

species would immediately thrive in a sheared area, contrasting the climax, woody vegetation and producing a greater diversity of habitats within the installation. Currently, these pioneer species are restricted to areas outside of the forest canopy where sunlight is available near the ground. A more diverse culture of vegetation can support an equally diverse culture of wildlife and ultimately results in a more productive community. Increased species diversity would reduce the impacts of disease and insects within a plant community.

Currently, the species inventory of Clear AFS is typical of undisturbed land within this region, making it unlikely that nonnative invasive plant species would become established on firebreaks and spread to the surrounding forest communities. Firebreaks would be inspected periodically to ensure nonnative invasive plant species do not threaten native plant communities. Any invasive plant species found would be controlled with the use of an approved control method.

Other proposed activities, such as constructing recreational cabins, a wildlife viewing area, and a nature trail, would impact limited resources and areas. Vegetation would be reestablished by natural succession in some areas and replanting of native species in areas vulnerable to erosion or siltation. Impacts to vegetation would not be significant.

Preparation of the soil survey would not impact vegetation. Overall impacts from this alternative would be beneficial to vegetation on the installation.

#### **4.2.3 Potential Impacts on Wildlife**

Impacts on wildlife from Alternatives A, B, or C are discussed below.

##### **Potential Impacts from Alternative A**

Alternative A would have the most negative impacts on fish and wildlife since there would be no specific activities that would provide or enhance habitat for specific wildlife population. Minimal effort would be made to monitor the presence of invasive fish species. These invasive species can hinder the productivity of desirable fish species by out-competing them for available food sources. This could indirectly affect the fishing program. No effort would be made to discourage swallows from nesting on installation buildings. Swallows would continue to be a nuisance to building occupants.

This alternative proposes limited wildlife management practices and the implementation of the minimum military mission requirements concerning natural resource management. Under this Alternative, no measures would be taken to manage unimproved grounds on the installation; therefore, wildlife habitat would receive no benefits.

##### **Potential Impacts from Alternative B**

Alternative B maintains the current low intensity natural resource management procedures incorporated by the installation. Although this Alternative is similar to Alternative A in its implementation of minimal management strategies on unimproved grounds, it does provide efforts for a forest stand inventory, apply pesticides for weed control on improved grounds, and allow only locally grown plant species for landscaping. These practices would aid in maintaining native vegetation as predominant species and allow continued success to the resident wildlife that inhabits these communities.

This Alternative would also provide efforts to inventory fish species and trapping and hunting harvests. These monitoring activities aid in analyzing current management procedures for deficiencies that may be addressed in future management plans. The continued removal of pest fish species and the non-application of pesticides near lakes would benefit desirable fish species by diminishing competition with pest species and decreasing toxins due to pesticide runoff.

This Alternative would not significantly impact wildlife on the installation.

### **Potential Impacts from Alternative C**

Alternative C proposes medium to high intensity natural resource management strategies that would provide beneficial impacts to the unimproved areas on the installation. These Alternatives propose prescribed burning, shearblading, and implementing a fire management plan as means of enhancing wildlife habitat heterogeneity.

The major effects on wildlife are indirect and pertain to changes in food and cover. Both prescribed burning and shearblading would increase the edge effect and amount of browse material, thereby improving conditions for moose, ruffed grouse, and other wildlife. These strategies can improve habitat for birds and animals by increasing food production and availability. All sides of the burn area would not be lit at the same time; therefore, motile wildlife would have ample escape routes and would not be trapped in the fire. Similar precautions would be applied for shearing as it would be performed at a pace gradual enough to allow motile wildlife to leave the project area. Due to the abundance of nearby forests, species would have the ability to seek new habitat while these measures are being conducted. Both prescribed burning and shearblading would improve long-term habitat for wildlife. A reduction in stand density would open the forest canopy allowing more light to penetrate to the forest floor, stimulating residual seed sources in the soil to sprout and produce grasses and shrubs. An addition of forest surface vegetation would make the stand more attractive and support a greater diversity of wildlife species.

Most adult birds can escape wildfires and move to areas not impacted by fire. The prescribed burns would be planned for times when bird-nesting sites are not being used and the known nesting areas would be protected during the planning stages of the prescribed burns. Burns would also be conducted before or after known breeding seasons. Prescribed burns would reduce the chance of severe fires that could have a significant impact on bird cover. There could be short-term impacts to ground, shrub, and small tree nesting birds; however, post fire conditions from the prescribed burns should improve conditions for many of these bird species and reduce the chance of severe fires that would have a significant impact on bird cover. A study conducted by the Society for Conservation Biology (Artman, 2001) investigated the effects of prescribed burns on forest birds in four study sites. The areas burned in the study were 50 to 75 acres either frequently (yearly for four years) or infrequently (at the beginning and end of the study period); the historical fire frequency was about once every five years. The researchers monitored bird species in both burned and unburned areas. The study found that three ground-nesting bird species (ovenbirds, worm-eating warblers, and hooded warblers) declined due to decreased leaf litter, shrubs, and saplings that birds depend on. Two species (American robins and eastern wood-pewees) increased because the burned areas improved their foraging habitat. The study concluded that long-term or large-scale

prescribed burning could change the bird community through changes in their foraging habitat.

Alternative C also proposes smaller scale projects that would benefit wildlife on the installation. Construction of alternative nesting sites for swallows would occur along with fish stocking. These practices, although specialized, would beneficially impact their target species on the installation. Other proposed activities, such as constructing recreational cabins, a wildlife viewing area, and a nature trail, would impact limited areas. Impacts to wildlife would not be significant.

#### **4.2.4 Potential Impacts on Threatened or Endangered Species, Species of Special Concern**

As noted in Section 3.4, no Federally-listed species are known to occur on Clear AFS. Maintenance of habitat is essential to the protection of plant and animal species found on the installation. Impacts on threatened or endangered species from Alternatives A, B, or C are discussed below.

##### **Potential Impacts from Alternatives A and B**

The minimum military mission requirements proposed under Alternative A and the low-intensity management practices, currently used by the installation, proposed by Alternative B entail no major land altering actions that would significantly impact any Federal or state listed species. A threatened and endangered plant and wildlife species inventory would not be conducted to determine if any species are present on the installation since the last survey.

##### **Potential Impacts from Alternative C**

Alternative C proposes major land altering actions (prescribed burning and shearblading) as means of managing native ecosystems. All but one of the special status plants occurred exclusively on sand and gravel bars along the Nenana River. Since these species are away from the project area, no significant impacts from prescribed burning or shearblading would occur. Only Williams' campion was found in the densely forested area associated with the project area. Burning or shearing of woody cover species would provide beneficial impacts to the lower successional Williams' campion by providing less competition for sunlight.

Alternative C would improve conditions for two resident bird species of concern on Clear AFS. After burning or shearing, both the gray-cheeked thrush and blackpoll warbler would have more access to their preferred ground level feeding areas. Also, after some regeneration has occurred, both species would benefit from small coniferous stands utilized for nesting. The northern goshawk, although not observed on Clear AFS during the last survey, would also benefit from these Alternatives due to the increase of open area for predatory purposes; this species would not be affected by a loss of nesting habitat due to the abundance of sufficient surrounding habitat. All bird species of concern would benefit from Alternative C.

Other smaller scale projects identified under land management, pest management, outdoor recreation, and cultural resources would not have a significant impact on threatened or endangered species.

#### **4.2.5 Potential Impacts on Wetlands**

Impacts on wetlands from Alternatives A, B, or C are discussed below.

##### **Potential Impacts from Alternative A**

Actions near or within wetlands would be discouraged under this Alternative, but wetland restoration would not occur. No major land altering actions would occur and impacts to wetlands would not be significant.

##### **Potential Impacts from Alternative B**

Current wetland management would allow for some construction activities near or within wetlands. Indirect impacts to wetlands would result from runoff of sediments from construction or ground disturbing activities. Utilizing best management practices to control erosion and runoff would minimize these impacts. Permits would be required prior to any activities near or within wetlands.

##### **Potential Impacts from Alternative C**

This Alternative proposes delineation and mapping of all wetlands and no construction in or near wetlands. The proposed recreational cabins, nature trail, and wildlife viewing area would be sited to avoid impacting wetlands. During forest management activities, an adequate buffer zone would be maintained to protect wetland areas.

Forest management activities could impact wetlands by minor siltation, but the impacts would be limited by the slight slopes in the area and by small branches and litter covering the ground in most areas. Potential impacts from siltation would not be significant.

The majority of wetlands in the project areas for the proposed forest activities are Palustrine scrub-shrub. These wetlands are dominated by aspens in upland areas where permafrost does not exist. Because of the gravel substrate in these wetland soils, these surface soils are not saturated like the peat layers over frozen muck that are commonly found in black spruce stands where aspen is absent (Paragi, 2001).

Shearblading in these wetlands would not cause significant impacts since the action would take place when ground is frozen. When the ground thaws the wetlands would most likely reestablish themselves. There are two Palustrine forested wetland areas located within the proposed project area that could contain black spruce. These wetlands would be further documented to determine if the tree species are white or black spruce. If these wetlands are found to contain black spruce, they would be avoided because the act of clearing this wetland type can cause the wetland to convert to uplands (through warming of the soil and thawing of the permafrost, increasing downward movement of water). Impacts to wetlands would not be significant through additional surveying and coordination with the USACE to avoid black spruce wetlands that could potentially be converted to uplands.

Burning the remaining windrowed trees would reduce the unsightliness of debris and remove the vertical structure that sometimes provides ground cover for terrestrial predators (red fox, marten, or short-tailed weasels) of early successional species such as ruffed grouse and songbirds (Paragi, 2001). Burning the debris in the windrows would also allow the installation to apply shearblading in areas of the base where dense spruce in the understory complicates mechanical treatments by themselves and hastens stand conversion



to a more flammable forest type (Paragi, 2001). Impacts from this alternative would improve conditions for vegetation and wildlife. Species of special concern would benefit from the shearblading and windrow burning. No windrows would be placed or burned in wetland areas. Burning windrows would not drastically alter the physical environment of the wetlands and wetland species would re-establish themselves in the long-term. With additional surveying and coordination with the USACE, impacts to wetlands would not be significant.

#### **4.2.6 Mitigation Measures**

No significant impacts have been identified to vegetation, wildlife, state-listed species; therefore no mitigation measures are required or recommended. Wetlands in the project area that have been identified as Palustrine forested wetlands by the National Wetland Inventory need to be delineated and further evaluated. If black spruce is found in the wetlands, these wetlands would be avoided by burning and shearblading.

### **4.3 PEST MANAGEMENT**

Alternatives A and B would not impact pest management or the physical and biological environment. Alternative C would result in long-term changes in pest management with minor impacts to the physical and biological environment. These impacts would not be significant.

#### **4.3.1 Analysis Methods**

Current pest management practices were reviewed as well as potential changes in pest management under the various alternatives. Potential impacts to the physical and biological environment from pest management were reviewed. Potential changes from other components of the INRMP which could impact pest management were also evaluated.

#### **4.3.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternative A**

The focus of pest management would be in mission critical areas. Suppression of invasive weed species and pests endangering the health and morale of personnel and mission critical elements would be accomplished using current practices of limited pesticide usage in accordance with the Small Installation Integrated Pest Management Plan (AFSPC, 2001d). Impacts to pest management and the physical and biological environment would not be significant.

##### **Potential Impacts from Alternative B**

Pest management would focus on main base areas utilizing current management practices. The scope of management would be slightly greater than Alternative A, but impacts would be similar, and would not be significant.

##### **Potential Impacts from Alternative C**

An Invasive Species Inventory and Control Plan would be completed at Clear AFS in an effort to provide more effective pest management. More emphasis would be placed on reducing pesticide usage through prevention of pests and the use of biological controls in

place of pesticides. Short-term changes would not be substantial, but as the Invasive Species Inventory and Control Plan is developed and implemented, and biological controls are introduced, a long-term decrease in pesticide application would be anticipated to occur. Other activities under Alternative C for the implementing the INPMP would also impact pest management. Prescribed fire or shearblading could potentially introduce invasive species of weeds, insects, and disease. The degree of impact would largely depend on the natural cycles of these species (i.e., the number of invasive weed species, insects, and plant disease in the area at the time of prescribed fire or shearblading, and their proximity to treated areas). Impacts from prescribed fire or shearblading would need to be assessed as part of the Invasive Species Inventory and Control Plan. Short-term impacts are not predicted to be significant due to the limited area to be treated (about one percent of the installation area annually for 10 years) and the distance between potentially treated areas and the main base. Long-term impacts from prescribed fire or shearblading would decrease as species diversity and long-term community succession would minimize any impacts. Impacts from constructing a nature trail, a wildlife viewing area, and recreational cabins would not be significant, but the extent of desired pest control in these areas would need to be determined.

#### **4.3.3 Mitigation Measures**

No significant impacts were identified; therefore, no mitigation measures are suggested.

### **4.4 OUTDOOR RECREATION PROGRAM**

Implementation of Alternative A would not effect outdoor recreation at Clear AFS. Minimal changes to outdoor recreation would occur under Alternative B. Alternative C would beneficially expand outdoor recreation opportunities at Clear AFS. Prescribed fire or shearblading under this Alternative would not significantly impact recreation opportunities.

#### **4.4.1 Analysis Methods**

Current outdoor recreation opportunities and the potential expansion of activities from the INRMP Alternatives were reviewed. The impact of other proposed activities under the INRMP, such as prescribed fire or shearblading, was also reviewed.

#### **4.4.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternative A**

No changes in outdoor recreation programs would occur under Alternative A. Existing programs would continue, but new programs would not be added. No impacts would be anticipated from this Alternative.

##### **Potential Impacts from Alternative B**

Existing programs would continue, and secondary roads would be cleaned up for use as recreational trails. This would enhance hiking, wildlife viewing, and hunting opportunities at Clear AFS, but no significant changes or impacts would occur.

## **Potential Impacts from Alternative C**

Current outdoor recreational programs would be maintained under this Alternative. These programs would be enhanced by the construction of a nature trail north of the composite area, a wildlife viewing area, and recreational cabins. Secondary roads would also be cleaned up for use as recreational trails. These activities would increase opportunities for outdoor recreation with minimal impacts to the physical environment and aesthetics. Other activities under Alternative C, including prescribed fire or shearblading of selected areas of forest, would have short-term impacts on the aesthetic values of affected areas (with an indirect impact on recreational values) (see Section 4.6). These impacts would not be significant because of the limited areas impacted, the limited number of people who would see these areas (many of these areas would not be visible from most hiking trails), and their temporary nature. In the long-term, prescribed fire or shearblading would have beneficial impacts to outdoor recreation, as both plant and animal species diversity would increase. Potential viewing and hunting opportunities would similarly increase.

### **4.4.3 Mitigation Measures**

Since no significant impacts were identified, no mitigation measures are suggested.

## **4.5 CULTURAL RESOURCES**

Cultural resources would be protected under all alternatives. If unanticipated cultural resources or sites are encountered during project work, work would be halted until the sites can be evaluated and protected.

### **4.5.1 Analysis Methods**

To determine potential impacts, the analysis focused on the types of activities that would occur and their location, and the significance of the resource in that location. *The Cultural Resource Management Plan* (USAF, 2001a) and previous NEPA documents were reviewed to provide data on existing cultural resources on the base. A study on the inventory of Cold War properties conducted in 1995 was reviewed for information on the eligibility of properties and their location in relation to the activities described in Chapter 2.

### **4.5.2 Potential Impacts of the Proposed Actions**

Impacts on cultural resources from Alternatives A, B, or C are discussed below.

## **Potential Impacts from Alternative A**

This Alternative would include the least amount of ground disturbance since no forest management or restoration activities would occur and no outdoor recreation activities would be developed. Efforts to identify and evaluate cultural resources would be conducted on a project-by-project basis. Current Memorandum's of Agreement between the base and Alaska State Historic Preservation Office for previously identified historic buildings would continue.

## **Potential Impacts from Alternative B**

This Alternative would continue efforts to identify and evaluate cultural resources and to integrate the program with the day-to-day management of Clear AFS. Minimal forest

management activities would take place, maintenance of firebreaks would be in previously disturbed areas. Limited outdoor recreation projects would be implemented. Impacts to cultural resources from Forest Management or Outdoor Recreation programs would not be significant.

### **Potential Impacts from Alternative C**

No known cultural resources have been identified in the project areas for the first year of Forest Management activities. According to the 1991 and 1994 reconnaissance surveys, the majority of the proposed project area is viewed as a low potential zone for preserved archaeological sites (USAF, 2001a). The possibility of disturbing unknown archaeological resources during Forest Management activities is low; therefore, impacts are not considered significant. No known Alaska Native cultural properties have been identified within the boundary of Clear AFS. No buildings potentially eligible for listing in the NRHP would be disturbed as part of this action.

Possible future sites for prescribed burning/shearblading identified near the Healy and Riley Creek terraces were identified as having moderate potential for cultural resources (see Figure 3.5-1). No subsurface sites were located on these features during the 1991 or 1994 surveys; however, only transects were surveyed and not the entire installation (USAF, 1995). The installation would coordinate with the State Historic Preservation officer prior to burning/shearblading near the Healy and Riley Creek terraces. To minimize impacts, the installation would either conduct further surveys in the area prior to activities or redefine future areas designated for activities to exclude moderate potential cultural resource areas.

The proposed project area for the nature trail, wildlife viewing area, and recreational cabin would be constructed in a low potential zone for cultural resources. It is not anticipated that cultural resources would be encountered in these areas. Limited soil disturbance would occur from soil borings to complete a soil survey. It is unlikely any cultural resources would be encountered.

In accordance with the Cultural Resources Management Plan, any person who plans to carry out work involving ground disturbance must first obtain a digging permit from Civil Engineering. Civil Engineering reviews the plans and determines if the action is in an area considered archaeologically sensitive. In accordance with the Cultural Resources Management Plan, should unknown archaeological resources be uncovered during proposed activities, work will cease for at least 24 hours, and the individual responsible for the supervision of the work will notify the Cultural Resources Manager. The Cultural Resources Manager would notify the State Historic Preservation Office and the National Park Service as required by 36 CFR 800.11(b), and the Archaeological and Historical Preservation Act (16 U.S.C. Sec. 469).

### **4.5.3 Mitigation Measures**

No significant impacts have been identified; therefore, no mitigation measures are required.

## **4.6 POTENTIAL IMPACTS ON AESTHETICS**

Short-term impacts from Alternative A or B would be minimal. Potential long-term impacts could be significant due to a continued high risk of wildfire. Depending on the location and extent of a wildfire, it could be visible to the general public. Most of the undesirable impacts related to the prescribed fire or shearblading under Alternative C are relatively short-term and would not be visible to the general public. Vegetation would flower and wildlife would return to the sheared areas in a relatively short amount of time. Long-term impacts from Forest Management activities would improve the visual appearance of the area. Smoke generated during the prescribed burns would be short-term and would not cause significant impacts to facilities on Clear AFS or the town of Anderson. Clearing of the recreational trails and construction of the wildlife viewing platform and recreational lodging would cause short-term unsightly views; however, the impacts would be short-term and are not visible to the general public. In the long-term the recreational trails, wildlife viewing platform, and recreational lodging would provide outdoor recreational benefits for personnel to enjoy the visual resources available on the installation.

### **4.6.1 Analysis Methods**

The analysis was based on discussions with personnel from the Alaska Department of Fish and Game, U.S. Army Corps of Engineers in Fairbanks, and Clear AFS, findings of the INRMP and Biodiversity Study, and a review of the nearest population areas to the installation. The review centered on whether the viewshed would be perceived as a visual impact after the Proposed Actions or Alternative occurred.

### **4.6.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

#### **Potential Impacts from Alternative A**

Modifications to the landscape would occur to a lesser extent under this Alternative. The proposed prescribed fire or shearblading would not occur under Alternative A. There would be an increased fire risk each year that prescribed fire or shearblading would not occur. Long-term impacts have the potential of being significant to aesthetics because of a higher risk of wildfire which would burn much of the vegetative cover and burn the overlying organic matter of the soil, generating large amounts of smoke and leaving an unsightly view on valuable landscapes and private property.

#### **Potential Impacts from Alternative B**

Maintenance of firebreaks and grounds would not have a significant impact on aesthetics. Any impacts would not be visible to the general public. The maintenance of firebreaks would somewhat reduce the hazard of wildfires on Clear AFS, but significant impacts to aesthetics could occur from these fires, as discussed under Alternative A.

Due to the limited nature of other activities implementing the INRMP, impacts to aesthetics would not be significant.

## Potential Impacts from Alternative C

As discussed in Section 3.6, the sensitivity of visual resources at Clear AFS is medium. Of the proposed activities under Alternative C, prescribed fire would result in the most visible aesthetic impact. Prescribed fire would generate smoke and produce landscapes of burned trees and soils in effected areas. About 100 acres per year would be burned for 10 years (about one percent of Clear AFS per year). One area to potentially be burned the first year is about 200 feet north of the radar site at the closest point and about ½ mile north of the composite area. There would be limited visibility of this area by base personnel, but it would not be visible to the public. Another potential area for prescribed fire is about 1.5 miles north of the composite area. It would not be visible to most base personnel or the public. Other sites have been tentatively planned in the western and northern parts of the installation. The direct impacts of prescribed fire would be short-term. The change in visual landscapes would include positive and negative aspects, and would vary according to personal opinion. Burning would open up areas where visibility is now limited by thick stands of black spruce. Vegetation would regenerate from the surrounding areas and would include greater diversity of species. The most noticeable change would be an increase in aspen and birch replacing areas of predominately black spruce, improving the visual appearance of the area. The number of visibility of flowering annuals and biennials would increase. Smoke generated during the prescribed fire would be visible from most areas of Clear AFS and the town of Anderson to the north of Clear. Impacts from prescribed fire would be short-term and would not cause significant impacts to facilities on Clear AFS or the town of Anderson.

Visibility protection areas, as defined by the State of Alaska, are between 30 and 65 miles south of Clear AFS. The impacts to visibility in these areas would not be significant.

Long-term impacts would be beneficial from creating a more diverse landscape and reducing the risk of wildfires. The visual impacts of shearblading would be similar in some respects to those resulting from prescribed fire.

The principal aesthetic effect of shearblading is contrast to the remaining features. Contrast, or change from the pre-shearblading landscape, can be positive or negative depending largely on personal opinion. Shearblading can improve aesthetic values by maintaining open stands, producing vegetative changes, and increasing numbers and visibility of flowering annuals and biennials. Most of the undesirable impacts are relatively short-term, i.e., the area shearbladed would see re-growth fairly quickly when the spring thaw occurs and temperatures begin to rise. Vegetation would flower and wildlife would return to the shearbladed areas in a relatively short amount of time.

The radar facility (Bldg 800) is within 200 feet of proposed shearblading sites. Other facilities on the installation are more than 1,000 feet away from the nearest proposed shearblading site. Future sites for shearblading have not yet been identified.

Clear AFS is a restricted area facility but civilians that work on Clear AFS are allowed to use the installation for hunting and fishing. The installation would develop procedures for informing hunters and fishermen of the areas and times proposed for shearblading. Since only 100 acres per year of the 11,000-acre installation would be shearbladed over 10 years, there are abundant forested areas on the installation for hunting. No significant impacts

from public perception of the action are anticipated and the action would not interfere with public hunting on the installation. Long-term impacts from the shearblading would improve the visual appearance of the sites.

Clearing vegetative debris from the secondary roads would be short-term (approximately 30 days). During vegetative debris removal there would be construction equipment and piled debris along the secondary roads that could be perceived as a negative visual impact. In the long-term, the trails would provide outdoor recreational benefits for personnel to enjoy the visual resources available on the installation.

Construction for the wildlife viewing area would be short-term (approximately 30 days). During the construction activity there would be construction equipment and debris in the project area that could be perceived as a negative visual impact. In the long-term, the wildlife viewing platform would provide outdoor recreational benefits for personnel to enjoy the visual wildlife resources available on the installation.

Construction for the recreational cabins would be short-term (approximately 12 months). During the construction activity there would be construction equipment and debris in the project area that could be perceived as a negative visual impact. In the long-term, the lodging would provide access to outdoor recreation such as cross-country skiing, jogging, bicycling, and fishing. Long-term impacts to aesthetics are considered beneficial because more personnel would have the opportunity to utilize the lodging and enjoy the natural visual landscape that the installation has to offer.

Clearing of the recreational trails and construction of the wildlife viewing platform and recreational lodging would cause short-term unsightly views; however, the impacts would be short-term and are not visible to the general public. In the long-term the recreational trails, wildlife viewing platform, and recreational lodging would provide outdoor recreational benefits for personnel to enjoy the visual resources available on the installation.

#### **4.6.3 Mitigation Measures**

No significant impacts have been identified, and no mitigation measures are required.

### **4.7 ENVIRONMENTAL JUSTICE**

There would be no environmental justice impacts as a result of implementing any of the proposed alternatives.

#### **4.7.1 Analysis Methods**

Measures used for impact analysis include demographic and income data obtained from the U.S. Bureau of Census (2000); these data were used to locate minority populations and low-income populations with the project area.

#### **4.7.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

#### **Potential Impacts from Alternatives A, B, or C**

No significant impacts to human health or the environment are anticipated from implementation of INRMP activities. Most activities would not impact or be noticeable

from nearby residents in Anderson. Construction of recreational cabins, a wildlife viewing area, and a nature trail would take place within installation boundaries and generate only minimal air emissions. Prescribed burns would be scheduled to occur during favorable meteorological conditions to limit the impact to nearby receptors. Any smoke observed from Anderson would be short-term and visible by all residents regardless of race or economic status. Air emissions (primarily particulates from smoke) would be short-term, temporary, and not significant. Other proposed activities, such as wetland, wildlife, and soil surveys, pest management, and fish stocking would not significantly impact off-base residents. There would be no significant impacts to low-income or minority populations or children as a result of the Alternatives.

#### **4.7.3 Mitigation Measures**

No significant impacts were identified; therefore, no mitigation measures are suggested.

### **4.8 PETROLEUM, OILS, AND LUBRICANTS**

Alternatives A would have no impact on environmental programs since prescribed burns or shearblading would not occur. Alternative B would minimally impact environmental programs as power equipment would be used to clear secondary roads and firebreaks. Alternative C would not have any significant impacts to POL management on Clear AFS. The likelihood of any spills or leaks from equipment or from filling drip torches for the prescribed burns that could not be cleaned up or contained is considered small.

#### **4.8.1 Analysis Methods**

The analysis was based on a review of the Clear AFS SPRP, federal and state laws and regulations, and details of the Proposed Action and Alternatives. The analysis focused on the frequency of shearblading and the amount of fuel mixture that would be used for windrow burning.

#### **4.8.2 Potential Impacts of the Proposed Actions**

Potential impacts from Alternatives A, B, or C are analyzed below.

##### **Potential Impacts from Alternatives A and B**

There would be no significant impacts to POL Management from these alternatives since minimal forest activities would take place that would use POLs. The risk of a fuel spill during clearing of secondary roads under Alternative B is slight and could be quickly cleaned up in accordance with the SPRP.

##### **Potential Impacts from Alternative C**

Standard construction equipment would be used for constructing recreational cabins, a wildlife viewing area, and a nature trail. Small amounts of fuel would be required for this equipment and refueling would likely take place at these locations. If shearblading is conducting, bulldozers would also require refueling at remote locations. Alternative C would require a small amount of standard accelerants be used for the prescribed burns. The accelerant would be placed in drip torches; the drip torches would be used to apply the accelerant to the dried vegetation from a predetermined control line. Only the amount of accelerant needed to conduct the prescribed burn would be used. In accordance with Clear AFS's spill plan, preventative maintenance is performed on all equipment to keep it in



good working order and minimize the potential for leaking oils or hazardous substances. The likelihood of any spills or leaks from equipment that could not be contained or cleaned up is considered small and impacts from this alternative are not considered significant. If the action is contracted out, contractors would be required to follow the same preventative maintenance procedures. The Clear AFS Fire Department would provide emergency response and fire protection in accordance with the SPRP.

Other activities proposed in the INRMP (wetland, wildlife, and soils surveys, pest management, fish stocking, cultural resource preservation, and installing alternate nesting sites for swallows) would not use substantial amounts of POLs. Any refueling of equipment would be conducted in accordance with the SPRP and impacts would not be significant.

#### **4.8.3 Mitigation Measures**

No mitigation measures beyond standard operating procedures are required, as no significant impacts were identified.

#### **4.9 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, AND LOCAL LAND USE PLANS, POLICIES, AND CONTROLS**

The Proposed Action would be compatible with the existing federal, state, and local land use plans, policies, and controls. The action is compatible with the Air Force's objective to provide organized management to all land resources within the confines of Clear AFS.

#### **4.10 RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY**

The Proposed Action would affect land that is not currently used for generating revenue or for recreational purposes. No wetlands would be filled as a result of implementing the Alternatives. Coordination between the installation, Alaska Game and Fish, and USACE would take place prior to Forest Management activities to ensure that wetlands dominated by black spruce are not converted to uplands. The long-term productivity of the wooded area affected would be improved by reducing fire hazards, redistributing soil nutrients, and promoting growth of favorable species.

#### **4.11 CUMULATIVE IMPACTS**

Cumulative impacts are those changes to the physical, socioeconomic, and biological environments that would result from the Proposed Action or Alternative in combination with past, present, and reasonably foreseeable future actions. Significant cumulative impacts could result from impacts that are not significant individually, but when considered together, are collectively significant. Cumulative air quality impacts could occur if prescribed burns or windrow burning occurred concurrently with natural wildfires in the area; however, wildfires usually occur during summer months and prescribed burns or windrow burning would occur during the spring. In addition, temporary prohibitions to prescribed burns or windrow burning could occur if a wildfire in the area threatened human resources and the State of Alaska Division of Forestry determined its capability to fight fires was being stretched too thin. Other ongoing or scheduled activities would also generate criteria air pollutants (primarily PM<sub>10</sub>), but the amounts would not be significant

with the addition of pollutants from proposed INRMP activities. For these reasons, there should be no significant cumulative air quality impacts.

Ongoing or scheduled projects at Clear AFS would also remove ground cover, exposing soil to potential erosion. Due to the limited areas to be disturbed by other current or scheduled activities (less than that which would likely occur from prescribed fire or shearblading) and the low potential for erosion at Clear, cumulative impacts to soil and water resources would not be significant. These disturbed areas would be replanted in some areas and allowed to revegetate in others, producing increased species diversity that would be beneficial to wildlife. Cumulative impacts to threatened and endangered species would not be significant. Due to increased protection of wetlands, cumulative impacts would not be significant as ongoing, scheduled, and proposed land-altering activities would avoid impacting wetlands to the maximum extent possible. The reduction in forest cover from all activities could potentially increase the invasion of non-desirable species. This would be addressed in the proposed Invasive Species Control Plan, but significant impacts would not be anticipated due to the relatively small area disturbed in the forested area at Clear and in surrounding areas.

Outdoor recreation would not be significantly impacted by current or scheduled projects at Clear, and would be enhanced by the proposed INRMP implementation. No significant cumulative impacts would occur. Significant cumulative impacts to cultural resources are not projected. Cumulative impacts to aesthetics and environmental justice would not be significant due to the limited degree of impact. Impacts to soil and water resources from POL management would not be significant due to the limited amounts of POLs used and the preventative measures within the SPRP.

#### **4.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

The irreversible and irretrievable commitment of resources would involve the use of materials, energy, and economic resources. The Proposed Action would require ordinary materials such as fuel and construction materials. These materials would, except for recyclable items, be irretrievably committed. Long-term commitments of resources would occur from expenditures to complete the Alternatives. The amounts of resource consumption would be small and comparable to other defense-related programs.

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# **CHAPTER 5**

## **REFERENCES**



## 5. REFERENCES

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**CHAPTER 6**  
**LIST OF PREPARERS**



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# APPENDIX A



## **APPENDIX A – Notice of Availability**

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This section includes a copy of the notice of availability published in the Fairbanks Daily News-Miner on Sunday April 27, 2003.



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**Public Comment  
on  
Clear Air Station's**

**Draft Environmental Assessment  
&  
Draft Finding of No Significant Impact  
for Implementation of Clear's  
Natural Resources Management Plan**

A draft environmental assessment of Clear Air Station's Integrated Natural Resources Management Plan is available for public review and comment. The assessment provides an overview of the impact of implementing proposed environmental programs at Clear.

The environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality. The draft EA and draft Finding of No Significant Impact (FONSI), dated April 2003, are available for review on the web at 63.227.151.204 or at the following locations:

**Anderson Community Library (Anderson School)**  
**1<sup>st</sup> and A Street**  
**Anderson, AK 99744**  
**Hours: Tues & Thur 6-9 p.m.; Sun 2-5 p.m.**

**Anderson City Building**  
**260 West 1<sup>st</sup> Street**  
**Anderson, AK 99744**  
**Hours: Tues-Fri 8:30**  
**a.m.-4 p.m.**

**Public comments on the EA will be accepted through May 26, 2003.** Written comments and inquiries on the EA should be directed to Mr. George Gauger, HQ AFCEE/ECE, 3207 Sidney Brooks, Brooks City Base TX 78235. Fax: (210) 536-3890. Email: [george.gauger@brooks.af.mil](mailto:george.gauger@brooks.af.mil)

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## **APPENDIX B**



**APPENDIX B –  
Air Emission Calculations**

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This section includes the calculations performed for estimating air emissions generated from activities related to the Forest Management Plan for conducting prescribed burns and shearblading. Emissions were estimated using emission factors from Air Pollutant Emission Factors (AP-42) (USEPA, 2001) and the Non-road Engine and Vehicle Emission Study (USEPA, 1991). Emissions were below the conformity threshold for ozone and further conformity analysis is not required under 40 CFR 193.153 (b).

Other activities proposed under the INRMP would not generate noticeable air emissions.

**Table of Contents**

Table B-1 Air Emissions from Prescribed Burns ..... B-3

Table B-2 Air Emissions from Shearblading ..... B-5

Table B-3 Air Emissions from Shearblading and Burn Windrows Alternative ..... B-7

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Table B-1 Air Emissions from Prescribed Burns								
Summary for Burning (emissions in tons per year)								
Tons per year	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>			
Year 1	63.96	5.29	3.36	0.36	6.67			
Prescribed Burns								
Emission Factors (in g/kg fuel burned)								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane				
Hardwood	12	112	6.1	6.4				
Conifer	13	126	5.7	4.2				
Fuel Loading								
Hardwood	13.5	Mg/H*						
Conifer	11	Mg/H*						
* Megagrams (1,000 kg) per Hectare. Full amount of fuel is 27 Mg/H for hardwood forest and 22 Mg/H for conifer forest; typically 25 to 50 percent of fuel is consumed in a prescribed fire. 50 percent is assumed as a conservative estimate.								
Area Affected*	Acres		Hectares					
Year 1	100.0		40.47					
* See schedule on page A-14								
Fuel Consumed (in kg)								
	Megagrams (Mg)		Kilograms (kg)					
	Hardwood	Conifer	Hardwood	Conifer				
Year 1	54.6345	400.6530	54,635	400,653				
Emissions in grams								
Hardwood								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	655,614	6,119,064	333,270	349,661	682,931	grams	hardwood	
Conifer								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	5,208,489	50,482,278	2,283,722	1,682,743	3,966,465	grams	conifers	
Emissions in pounds								
Hardwood								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	1,444	13,478	734	770	1,504	lbs	hardwood	
Conifers								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	11,472	111,194	5,030	3,706	8,737	lbs	conifers	



Emissions of Hardwoods and Conifers in pounds								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	12,917	124,673	5,764	4,477	10,241	lbs	hardwood and conifer	
Emissions of Hardwoods and Conifers in tons								
			VOC					
	PM <sub>10</sub>	CO	Methane	Non Methane	Total			
Year 1	6.46	62.34	2.88	2.24	5.12	tons	hardwood and conifer	
<b>Notes</b>								
Emission factors from Table 13.1-3, AP-42 Vol 1 (USEPA, 2001a)								
Fuel load factors from Table 13.1-1, AP-42 Vol 1 (USEPA, 2001a)								
Assumed 50 percent hardwood and 50 percent conifer								
Emissions generated from prescribed burns vary widely according to many factors (meteorological conditions, topography, species of vegetation, moisture content, amount of dry and green material, ground cover, fire type, and the relative time in fire phases (especially flaming and smoldering). The above worksheet characterizes typical conditions in the Northwest U.S., but the actual emissions from any given fire could be substantially lower or higher.								
<b>Vehicle Emissions</b>	<b>Days</b>	<b>Hours/day</b>	<b>Pieces</b>	<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Fire engine	100	8	2	1.80	0.19	4.17	0.45	0.26
Emissions (lbs)				2880.00	304.00	6672.00	720.00	416.00
<b>Total Emissions</b>	<b>tons</b>			<b>1.44</b>	<b>0.15</b>	<b>3.34</b>	<b>0.36</b>	<b>0.21</b>
<b>Worker Vehicle Trips</b>								
<b>Exhaust</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Number of workers	10		EF (g/mi)	3.34	0.28	0.45	0	0.01
Commute (miles)	50		lbs/mi	0.0074	0.0006	0.0010	0.0000	0.0000
Days	100		Amt (lbs)	367.84	30.84	49.56	0.00	1.10
Total Miles	50,000		<b>Amt (tons)</b>	<b>0.18</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>
EF = Emission Factor for calendar year 2000 (USEPA, 2001a) in grams per mile								
<b>Total Vehicle Emissions</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
			<b>tons</b>	<b>1.62</b>	<b>0.17</b>	<b>3.36</b>	<b>0.36</b>	<b>0.21</b>
<b>Total Emissions (in tons per year)</b>								
<b>Burn and vehicles</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Year 1				63.96	5.29	3.36	0.36	6.67

Table B-2 Air Emissions from the Shearblading								
Summary for Shearblading (emissions in tons per year)								
	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>			
Tons per year	0.94	0.16	1.57	0.15	0.80			
Construction Equipment								
Equipment	Days	Hours/day	Pieces	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Bulldozer	90	8	2	1.03	0.21	2.16	0.21	0.21
Emissions (lbs)				1481.76	296.35	3111.70	296.35	296.35
Total Emissions	pounds			1481.76	296.35	3111.70	296.35	296.35
Total Emissions	tons			0.74	0.15	1.56	0.15	0.15
Pickup Trucks								
Exhaust				CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Number of trucks	2		EF (g/mi)	1.37	0.47	1.06	0	0
Miles per day	10		lbs/mi	0.0030	0.0010	0.0023	0.0000	0.0000
Days	90		Amt (lbs)	5.43	1.86	4.20	0.00	0.00
Total Miles	1,800		Amt (tons)	0.00	0.00	0.00	0.00	0.00
EF = Emission Factor for 1990 and newer vehicles (USEPA, 2001a) in grams per mile, for light duty diesel trucks								
Worker Vehicle Trips								
Exhaust				CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Number of workers	10		EF (g/mi)	3.867	0.274	0.319	0	0
Commute (miles)	50		lbs/mi	0.0085	0.0006	0.0007	0.0000	0.0000
Days	90		Amt (lbs)	383.29	27.16	31.62	0.00	0.00
Total Miles	45,000		Amt (tons)	0.19	0.01	0.02	0.00	0.00
EF = Emission Factor for 1998 and newer vehicles (USEPA, 2001a) in grams per mile, for light duty gas trucks								
PM <sub>10</sub> from Trucks on Unpaved Roads								
Emission factor			0.724 pounds per vehicle mile traveled					
			2 trucks					
PM <sub>10</sub> = $K (s/12)^a (W/3)^b$			10 miles traveled per day per truck					
(M/0.2) <sup>c</sup>			20 miles traveled per day					
			90 days					
K = empirical constant, equals 2.6			1800 total miles					
s = surface material silt content (15%)			1302.6 pounds PM <sub>10</sub>					
a = empirical constant, equals 0.8			0.65 tons PM <sub>10</sub>					
W = mean vehicle weight (2 tons)								
b = empirical constant, equals 0.4								
M = moisture content (15%)								
c = empirical constant, equals 0.3								
SUMMARY								
	Amounts in tons per year							
	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>			
Vehicles on Unpaved Roads (fugitive dust)					0.65			
Construction Equipment	0.74	0.15	1.56	0.15	0.15			
Pickup Trucks	0.00	0.00	0.00	0.00	0.00			
Worker Vehicles	0.19	0.01	0.02	0.00	0.00			
TOTAL Construction	0.94	0.16	1.57	0.15	0.80			

<b>Pounds</b>	1,870	325	3,148	296	1,599			
<b>Pounds/day avg</b>	<b>134</b>	<b>23</b>	<b>225</b>	<b>21</b>	<b>114</b>			
<b>Tons/day avg</b>	<b>0.07</b>	<b>0.01</b>	<b>0.11</b>	<b>0.01</b>	<b>0.06</b>			
<i>Sources:</i>								
USEPA, 2001a								
USEPA, 1991								
<b>Assumptions</b>								
90 workdays								
Two bulldozers for shearblading and windrows								
Two pickup trucks for refueling bulldozers and transporting small equipment and supplies								

Table B-3 Air Emissions from Shearblading and Burn Windrows Alternative							
Summary for Burning and Vehicles (emissions in tons per year)							
Tons per year	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>		
	63.24	5.21	1.69	0.18	6.56		
Burning Windrows							
Emission Factors (in g/kg fuel burned)							
			VOC				
	PM <sub>10</sub>	CO	Methane	Non Methane			
Hardwood	12	112	6.1	6.4			
Conifer	13	126	5.7	4.2			
Fuel Loading							
Hardwood	13.5	Mg/H*					
Conifer	11	Mg/H*					
* Megagrams (1,000 kg) per Hectare. Full amount of fuel is 27 Mg/H for hardwood forest and 22 Mg/H for conifer forest; burning 50 percent of the windrows is assumed as a conservative estimate.							
Area Affected							
Acres per year	100.0	40.5	hectares per year				
Fuel Consumed (in kg)							
	Megagrams (Mg)		Kilograms (kg)				
	Hardwood	Conifer	Hardwood	Conifer			
Per Year	54.63	400.65	54,635	400,653			
Emissions in grams							
Hardwood							
			VOC				
	PM <sub>10</sub>	CO	Methane	Non Methane	Total		
Per Year	655,614	6,119,064	333,270	349,661	682,931	grams	hardwood
Conifer							
			VOC				
	PM <sub>10</sub>	CO	Methane	Non Methane	Total		
Per Year	5,208,489	50,482,278	2,283,722	1,682,743	3,966,465	grams	conifers
Emissions in pounds							
Hardwood							
			VOC				
	PM <sub>10</sub>	CO	Methane	Non Methane	Total		
Per Year	1,444	13,478	734	770	1,504	lbs	hardwood
Conifers							
			VOC				
	PM <sub>10</sub>	CO	Methane	Non Methane	Total		
Per Year	11,472	111,194	5,030	3,706	8,737	lbs	conifers

<b>Emissions of Hardwoods and Conifers in pounds</b>								
			<b>VOC</b>					
	<b>PM<sub>10</sub></b>	<b>CO</b>	<b>Methane</b>	<b>Non Methane</b>	<b>Total</b>			
Per Year	12,917	124,673	5,764	4,477	10,241	lbs	hardwood and conifer	
<b>Emissions of Hardwoods and Conifers in tons</b>								
			<b>VOC</b>					
	<b>PM<sub>10</sub></b>	<b>CO</b>	<b>Methane</b>	<b>Non Methane</b>	<b>Total</b>			
Per Year	6.46	62.34	2.88	2.24	5.12	tons	hardwood and conifer	
<b>Notes</b>								
Emission factors from Table 13.1-3, AP-42 Vol 1 (USEPA, 2001a)								
Fuel load factors from Table 13.1-1, AP-42 Vol 1 (USEPA, 2001a)								
Assumed 50 percent hardwood and 50 percent conifer								
<b>Vehicle Emissions</b>	<b>Days</b>	<b>Hours/day</b>	<b>Pieces</b>	<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Fire engine	100	8	1	1.80	0.19	4.17	0.45	0.26
Emissions (lbs)				1440.00	152.00	3336.00	360.00	208.00
<b>Total Emissions</b>	<b>tons</b>			<b>0.72</b>	<b>0.08</b>	<b>1.67</b>	<b>0.18</b>	<b>0.10</b>
<b>Worker Vehicle Trips</b>								
<b>Exhaust</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Number of workers	10		EF (g/mi)	3.34	0.28	0.45	0	0.01
Commute (miles)	50		lbs/mi	0.0074	0.0006	0.0010	0.0000	0.0000
Days	100		Amt (lbs)	367.84	30.84	49.56	0.00	1.10
Total Miles	50,000		<b>Amt (tons)</b>	<b>0.18</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>
EF = Emission Factor for calendar year 2000 (USEPA, 2001a) in grams per mile								
<b>Total Vehicle Emissions</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
			<b>tons</b>	<b>0.90</b>	<b>0.09</b>	<b>1.69</b>	<b>0.18</b>	<b>0.10</b>
<b>Total Emissions (in tons per year)</b>								
<b>Burn and vehicles</b>				<b>CO</b>	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM<sub>10</sub></b>
Per Year				63.24	5.21	1.69	0.18	6.56



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